DANGER ZONE*



Service Manual

DANGER ZONE

INSTALLATION AND MAINTENANCE

THE LELAND CORPORATION

1841 Friendship Drive

El Cajon, California 92020

Telex: CINTRON 4974293

FAX: 619-562-9468

FCC WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications.

It has been tested and found to comply with the limits for class A computing devices pursuant to subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

POWER REQUIREMENT WARNING !

A power supply capable of supplying the following current (or greater) must be used in this game:

7 amps @ + 5.0 VDC
1 amp @ - 5.0 VDC
1 amp @ + 12.0 VDC

RECORD OF SERIAL NUMBERS

Record the game serial numbers and date purchased for future reference and/or game service.

Date purchased:__________________

Main Circuit Board S/N:________________

Dual Shaft Encoder circuit board S/N:_____________

Program part number (on EPROMs) :________________

Software serial number (on "attract mode" screen):_____________

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LIST OF ILLUSTRATIONS

A. WARRANTY

Seller warrants that its printed circuit boards, monitor and power supply, when furnished with the product and parts thereof are free from defects in material and workmanship under normal use and service for a period of ninety (90) days from date of shipment. Seller's warranty of above parts is subject to the normal use and service of its product. None of the seller's other products or parts thereof are warranted.

If the products described in this manual fail to conform to this warranty, seller's sole liability shall be, as mutually agreed, to replace or repair such products which are returned to seller during said warranty period provided.

CONDITIONS:

a. Seller must be promptly notified in writing upon discovery by buyer that said products are defective.
b. Products must be returned prepaid to seller plant.
c. Seller's examination of said products discloses to seller's satisfaction that such alleged defects existed and were not caused by accident, misuse, neglect, alteration, improper repair, installation or improper testing.

Seller is not responsible for bent pins on ICs not installed by seller's employees. In no event shall seller be liable for loss of profits, loss of use, incidental or consequential damages.

Except for this express warranty, seller disclaims all other warranties, expressed or implied, including the implied warranties of merchantability and fitness for a particular purpose, and all other obligations or liabilities on seller's behalf, and it neither assumes nor authorizes any other person to assume for seller any other liabilities in connection with the sale of products manufactured by seller.

NOTICE REGARDING THE USE OF NON-SELLER REPLACEMENT PARTS:

Seller recommends the use of only seller's parts when replacing any malfunctioning component or assembly in the seller's system. For safety and reliability, seller does not recommend or authorize any substitute parts or modifications of seller's equipment. Such alterations may adversely affect game play, cause serious injury, and void your warranty. Unauthorized parts, modifications and non-seller's game conversion kits may also void FCC compliance.

To obtain repair, contact seller at 619-562-7000 between 8 AM and 5 PM Pacific Standard Time to obtain an RMA return authorization number. Affix this number to the outside of the shipping container when returning goods. Return to the above address.

B. HINTS FOR SUCCESSFUL GAME OPERATION

B. HINTS FOR SUCCESSFUL GAME OPERATION

Take some advice from the game masters. Successful game operation can be simple if you take a minute and read the following hints. It is worth it's weight in aspirin!

1. RUN DIAGNOSTICS

If you are having trouble with a certain feature on your game use the diagnostic feature. Five minutes of diagnostics may save an hour of frustration wondering why a feature does not work. Our software department is the best in the business. They labored long and hard to write diagnostics to thoroughly check out your game. Take the time to follow the diagnostics section and prove to yourself that the entire game is working properly.

Next, play the game a couple of times to verify that all is well.

2. MONITOR OUTPUTS

For future reference the outputs from our system to the monitor are red, green and blue with negative horizontal and negative vertical sync.

3. HOW DO I TURN UP THE SOUND ?

Volume adjustment is easy. Refer to figure 4 and locate VR1 (on main circuit board). Now look at the main board (largest board). Clockwise rotation increases the volume.

C. BOOKKEEPING/DIAGNOSTIC FUNCTIONS

C. BOOKKEEPING / DIAGNOSTIC FUNCTIONS

DANGER ZONE has extensive bookkeeping and diagnostic functions. These functions are explained in the following sections:

1. INVOKING DIAGNOSTICS

With the game running in the attract mode follow these steps:

a. Press and hold the one-player start button while pressing and releasing the service button (found inside the coin door mounted to the top of the coin box).

b. Release the one-player start button.

c. The game screen should now appear. Instructions for selecting and entering the listed functions are displayed at the top of the screen with the five selectable options below them. The game's software version number is shown in the lower left-hand corner of the screen.

2. SELECTING THE DESIRED FUNCTION

The one-player start button selects the desired function. The function has been selected when the display color for that particular function changes. Pressing the two-player start button enters the selected function. Selecting the RESET THE GAME function returns the game to normal operation.

An example of the display is as follows:

```
                   MAIN MENU

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

        BOOKKEEPING
        DIAGNOSTICS
        GAME SET-UP
        HALL OF FAME
        GAME DURATION STATISTICS

        RESTART GAME
        CANCEL CHANGES AND RESTART GAME

S/N: XXXXXXXX
```

3. BOOKKEEPING

The bookkeeping screen is displayed when that option is selected and entered from the main menu.
Five lifetime counters are shown. These counters are set to zero at the factory and are not resetable by the operator. These counters are:

COINS DROPPED MECH 1- This counter shows the total number of coins that have dropped through the LEFT coin mech.

COINS DROPPED MECH 2- This counter shows the amount of coins that have dropped through the RIGHT coin mech.

TOTAL COINS DROPPED- This is the total number of coins dropped through BOTH mechs.

SERVICE BUTTON PRESSED- The number of times that the service button has been pressed. Pressing the service button to enter the bookkeeping/diagnostic section does not affect this counter.

TOTAL CREDITS GIVEN- The total number of credits the game has given in it's lifetime is shown on this counter. (See the game set-up section of this manual for information on setting the number of coins per credit).

a. PERIOD AND DOLLAR COUNTERS

Three resetable counters, located to the right of the lifetime counters are provided to aid the operator in tracking the games' cash intake over a period of time. These counters are:

1. coins dropped
2. dollars collected

As in the main menu, these options are selected by pressing the one-player start button and entered by pressing the two-player start button. To reset the period and dollar counters for either coin mech, press the one-player until the message "RESET COIN MECH 1 (or 2) DOLLARS COLLECTED" changes color. Then press the two-player start button.

b. SETTING COINS/TOKENS PER DOLLAR

To calculate dollars ollected, the bookkeeping system needs to know how many coins/tokens are required to make a dollar. Normally, this number would be 4 for quarter operation. If you operate a location where for example , 6 tokens equal one dollar, then the dollar multiplier should be changed to 6 so that the dollars collected counters will reflect accurately what the game has earned.

To change the coin "multiplier," use the one-player start button to highlight the COINS PER DOLLAR message for the desired coin mech then use the two-player start button to change the multiplier.

c. EXAMPLE OF SETTING TOKENS PER DOLLAR

An arcade giving 10 tokens per dollar should have the coins/tokens per dollar multiplier set as shown.

An example of the display is as follows:

10 COINS PER DOLLAR COIN MECH 1
10 COINS PER DOLLAR COIN MECH 2

NOTE: The coins per dollar multiplier does not affect the number of coins per credit or credits per coin. See the game set-up section of this manual for that information.

BOOKKEEPING

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

	LIFETIME COINS	PERIOD COINS/DOLLARS	
COINS DROPPED MECH 1	0	0	$ 0.00
COINS DROPPED MECH 2	0	0	$ 0.00
TOTAL COINS DROPPED	0	0	$ 0.00
SERVICE BUTTON PRESSED	0		
TOTAL CREDITS GIVEN	0		

RESET COIN MECH 1 DOLLARS COLLECTED
RESET COIN MECH 2 DOLLARS COLLECTED

SET COINS/TOKENS PER DOLLAR=
4 COINS PER DOLLAR COIN MECH 1
4 COINS PER DOLLAR COIN MECH 2

RETURN TO MAIN MENU

4. DIAGNOSTICS

The diagnostic menu is displayed upon entering diagnostics from the main menu. The player can then select the desired function.

An example of the display is as follows:

```
                         DIAGNOSTICS

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

              BUTTONS AND CONTROL TEST
              PROCESSOR MEMORY TEST
              VIDEO ALIGNMENT SCREENS
              VIDEO MEMORY TEST
              SOUND TEST
              VIEW BACKGROUND SCREENS

              RETURN TO MAIN MENU
```

a. BUTTONS AND CONTROLS TEST

This test allows the operator to check the game controls and switches. Pressing a button or activating a control causes the description of that button or control to change color on the video screen.

```
              BUTTONS AND CONTROL TEST

        PLEASE PRESS THE FOLLOWING BUTTONS=

        PLAYER 1 START                        CLOSED
        PLAYER 2 START                        CLOSED
        MECH 1 COIN SWITCH
        MECH 2 COIN SWITCH
        SERVICE SWITCH

        FIRE BUTTON
        MISSILE BUTTON

        HORIZONTAL SCROLLING

        VERTICAL SCROLLING

   PRESS FIRE AND MISSILE AT THE SAME TIME TO
   CALIBRATE TURRET.

   PRESS THE PLAYER 2 OR SERVICE BUTTON TWICE TO EXIT.
```

b. PROCESSOR MEMORY TEST

The processor memory test checks all on-board RAM and PROM memory with the exception of the video memory. The messages TESTING MASTER ROM, TESTING MASTER RAM, TESTING COLOR RAM, TESTING SLAVE PROM, TESTING SLAVE RAM will each appear on the left side of the screen as each of those tests are performed. The result of each test (pass or fail) is displayed on right side of the screen next to the description of that test.

Two error messages may appear during slave memory test, these are COMMUNICATION ERROR and SLAVE NOT RESPONDING. IC's to be checked, in order of priority, are listed below:

COMMUNICATION ERROR -
a. U19
b. U21
c. U45
d. U60
e. U62
f. U64

SLAVE NOT RESPONDING -
a. U10
b. U3
c. U1
d. U2
e. U20,U18
f. U61,U63

In the case of a failure of a ROM or RAM, the location (U number) of the suspected part is shown on the screen.

The following is an example of the display indicating a U107 failure:

PROCESSOR MEMORY TEST

TESTING MASTER ROM	MASTER ROM	BAD
	CHIP U107	SUSPECT
TESTING MASTER RAM	MASTER RAM	GOOD
TESTING COLOR RAM	COLOR RAM	GOOD
TESTING SLAVE ROM	SLAVE ROM	GOOD
TESTING SLAVE RAM	SLAVE RAM	GOOD

PRESS THE PLAYER TWO START OR SERVICE BUTTON TO EXIT

c. VIDEO ALIGNMENT SCREENS

Three video alignment screens are provided to aid in adjusting the game's video monitor for maximum picture quality. Refer to the video monitor technical manual (not supplied) for technical information and adjustment instructions.

The first screen consists of a white crosshatch pattern. This should be used to adjust screen position, horizontal size, vertical size and focus. Pressing the player two start button advances the display to the next alignment screen.

The second alignment screen is used to adjust the red and green intensity. An eight level (0-7) color scale is shown for each red and green. The monitor should be adjusted so that level zero is black, and one through seven appear as seven distinct levels.

The third alignment screen shows a four level blue color scale. Adjust the blue intensity so that level zero is black and levels one through three show as three distinct levels of blue. Eight other colors are also displayed for reference, they are from 0-7: blue, green, red, cyan, magenta, yellow, gray and white.

d. VIDEO MEMORY TEST

The video memory test checks the foreground video memory. The test appears as a series of colored bars moving across the screen. After each pass (about 5 seconds), the results of the test will be displayed on the screen.

If the test was successful (all RAMs good), the message "VIDEO RAM CHECKS OK" will be displayed for about 1 second and the test will be repeated. Pressing the two-player start button anytime during the test will abort the test and return you to the diagnostic menu.

If the memory test fails, the message "VIDEO RAM TEST FAILED" will be displayed along with the location (U number) of the suspect RAM. In the event that the video error is unreadable, a series of tones will also indicate the suspect chip (see table below).

NUMBER OF AUDIBLE BEEPS	SUSPECT ICs
2	U35 and U36
4	U33 and U34
6	U48 and U49
8	U46 and U47

e. SOUND TEST

This allows the operator to cycle through all the different sounds in the game and verify that each sound is clear. This will cycle through to the end of the test one at a time.

SOUND TEST

SOUND TO HEAR
EXIT SOUND TEST

PRESS PLAYER 1 TO SELECT SOUND.
PRESS PLAYER 2 TO HEAR SOUND.

f. BACKGROUND AND SCROLLING

This test is set-up to view all of the background screens by using player 1 start to advance each screen or the entire background may be scanned by vertical and horizontal movement of the Turret.

BACKGROUND AND SCROLLING

NOW VIEWING PROMS U70 AND U92

PLAYER ONE ADVANCES
PLAYER TWO EXITS
TURRET VIEWS SCREENS

5. GAME SET-UP

The game option set-up section allows the operator to change various game options. As explained in previous sections, the one player start button selects and highlights the desired function and the two player start button enters or executes the function.

a. COINS PER CREDIT / CREDITS PER COIN

The coinage of each mech may be set to require multiple coins for each credit or give multiple credits for each coin.

To change coinage, follow the example screens below:
(All examples assume 1 coin=25 cents)

For 25 cent play: 1 COIN FOR
1 CREDIT

For 50 cent play:	2 COINS FOR 1 CREDIT
Two plays for 25 cents:	1 COIN FOR 2 CREDITS

b. EXTRA PLAY

An option is included to award an extra play for the insertion of multiple coins before the game is started.

For example; if the coinage is set as follows:

1 COIN FOR
1 CREDIT
EXTRA PLAY FOR 2 CREDITS

Then the result will be, 1 coin will give 1 credit and 2 coins will give 3 credits. Each additional coin will add one credit.

c. ATTRACT MODE SOUND

This option when selected enables the game sounds during the attract mode.

An example of this is as follows:

GAME SET-UP

SELECT FUNCTION WITH ONE-PLAYER START BUTTON
ENTER FUNCTION WITH TWO-PLAYER START BUTTON

COIN MECH 1
1 COIN FOR
1 CREDIT
NO EXTRA PLAY

COIN MECH 2
1 COIN FOR
1 CREDIT
NO EXTRA PLAY

TWO PLAYER INNING FOR 1 CREDIT _ _ _ _ _ _ _ _NO
ATTRACT MODE SOUND _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _YES

RETURN TO MAIN MENU

d. DIFFICULTY LEVEL

The difficulty level on the game is set by the operator. The levels range from one to eight with eight being the most difficult.

6. HALL OF FAME

This function allows the operator to erase the top player lists from the attract mode.

HALL OF FAME
SELECT FUNCTION WITH THE ONE PLAYER START BUTTON
ENTER FUNCTION WITH THE TWO PLAYER START BUTTON

ERASE HALL OF FAME ON EXIT. . . . . .NO

RETURN TO MAIN MENU

7. GAME DURATION STATISTICS

Graphs are provided which indicate the number of one and two player games. Average play time is also displayed. These graphs may be reset by selecting the reset options located at the bottom of the screen.

GAME DURATION STATISTICS

SELECT FUNCTION WITH ONE PLAYER START BUTTON
ENTER FUNCTION WITH TWO PLAYER START BUTTON

ONE PLAYER GAME TIME		AVERAGE TIME: 0:00
0:00-1:30	0	
1:31-2:00	0	
2:01-2:30	0	
2:31-3:00	0	
3:01-3:30	0	
3:31-4:00	0	
4:01-4:30	0	
4:31-5:00	0	
5:01-5:30	0	
5:31-6:00	0	
6:01-6:30	0	
6:31-7:00	0	
7:01-UP	0	

TWO PLAYER GAME TIME		AVERAGE TIME= 0:00
0=00-3=00	0 :	
3=01-4=30	0 :	
4=31-6=00	0 :	
6=01-7=00	0 :	
7=01-8=00	0 :	
8=01-9=00	0 :	
9=01-10=00	0 :	
10=01-12=00	0 :	
12=01-15=00	0 :	
15=01-UP	0 :	

RESET PLAYER 1 STATISTICS
RESET PLAYER 2 STATISTICS

RETURN TO MAIN MENU

D. SYSTEM TROUBLESHOOTING GUIDE

The entire Cinemat game system can be broken down into major groups. A brief guide to troubleshooting each section follows:

1. INPUT/OUTPUT FUNCTIONS:

   a. MONITOR

      1. No raster (i.e. black screen)

         a. Check AC supply to monitor. If there is no power at the monitor, trace the wiring back to the isolation transformer and/or verify that power is reaching the transformer.

         b. Check monitor fuses.

      2. Display scrolls (apparent syncronization problem).

         a. Check monitor alignment adjustments.

         b. Check RGB and syncronization signals on PCB connector and trace through to the monitor.

      3. Black screen

         a. Check for +5.0 VDC at circuit boards.

         b. Check connectors are securely seated and in the proper position.

4. White or checkerboard screen.

   a. Check for +5.0 VDC on P4 - 3 through 7. If any of these signals are low, replace U114 (74LS08). If this fails, replace U119 (74LS257).

   b. Check the clock signal on the master Z80 (U99-6), BASEBALL, THE SEASON II I/O and Memory Expansion Board (U13), REDLINE RACER Sound Board (U14).

   c. Check reset on the Z80 (U99-26). This signal should normally be high and go low when the reset button is pressed.

5. White or red vertical lines close together on entire screen or half of screen.

   a. Check video RAMs U33 through U36 and U46 through U49. Refer to sheet 11 and 18 on schematic.

6. Vertical lines on playing field (background).

   a. Check signals on U81 through U83 (74LS166's).

   b. Regarding other background problems, check the position of JP2 Jumpers, swap U56, (74LS461) with U60, see if problem disappears.

7. White vertical bars, usually on half of screen sometimes with an audio buzz.

   a. Caused by excessive temperature. Swap U45 with U23 and/or U60 with U22 (74LS461's).

8. Intermittent flashing video or color changes.

   a. Check for +5.0 VDC at circuit boards. TP1 and TP2 (+5 VDC)

9. Picture freezes.

   a. Check for +5.0 VDC at circuit boards. TP1 and TP2 (+5 VDC)

   b. Check Z80s (U1 and U99). They should be Zilog Mostek devices with a "B" suffix (6 MHz). If not call for replacement.

   c. Check for damaged sockets on master EPROMs and master CPU.

10. Drifting pattern (any color).

a. Check connector and signals on P1.

b. Sign of synchronization problems. Check DCLK.

c. Check U40 (RGS09), U42 (RGS07), and U43 (RGS08).

b. BUTTONS JOYSTICKS AND COIN COUNTERS.

1. A careful visual inspection of the buttons, harnesses and connectors is advised.

a. Inspect harness crimps.

b. Check for broken wires.

c. Check for broken solder joints at the termination point.

2. Trace signals through back to the input IC on the PCB.

2. ELECTRONICS

a. MAIN BOARD ELECTRONICS.

1. Problems can sometimes be traced to a bad CPU or crystal. Check the master and slave CPU's and their associated components.

2. Check EPROMs for background and foreground display and the associated video timing logic.

3. Check power at the ICs.

b. ADD ON BOARD(S) THAT CONTROL GAME SPECIFIC FUNCTIONS.

1. Again, check for functions specific to the board.

2. Check all ICs for proper socket installation.

3. Check power at the ICs.

3. GENERAL KNOWLEDGE

A. Proper voltage input jumpering on the board is critical! Follow the instructions on this carefully. A symptom of improper jumpering is an audio buzz or no audio. Check for 12.0 to 15.0 VDC at U122-5 (audio amp). Refer to Power Supply Modification section of manual. NOTE: If your speaker is not connected, you will not

hear any sound! Seriously, try adjusting the audio volume control pot (VP1). See section B-3 above on adjusting the volume.

B. GAME POWERS UP WITH GARBAGE ON THE SCREEN - NO BUTTONS FUNCTION - AUDIO MAY BUZZ

1. Remove P4 and P5 and reset system (push button on main board). If picture appears, the problem may be a stuck coin switch, button or bad harness or ground connection.

2. Visually inspect connector crimps and wire colors.

3. Check for + 5.0 VDC at board.

C. A WORD ABOUT COIN COUNTERS:

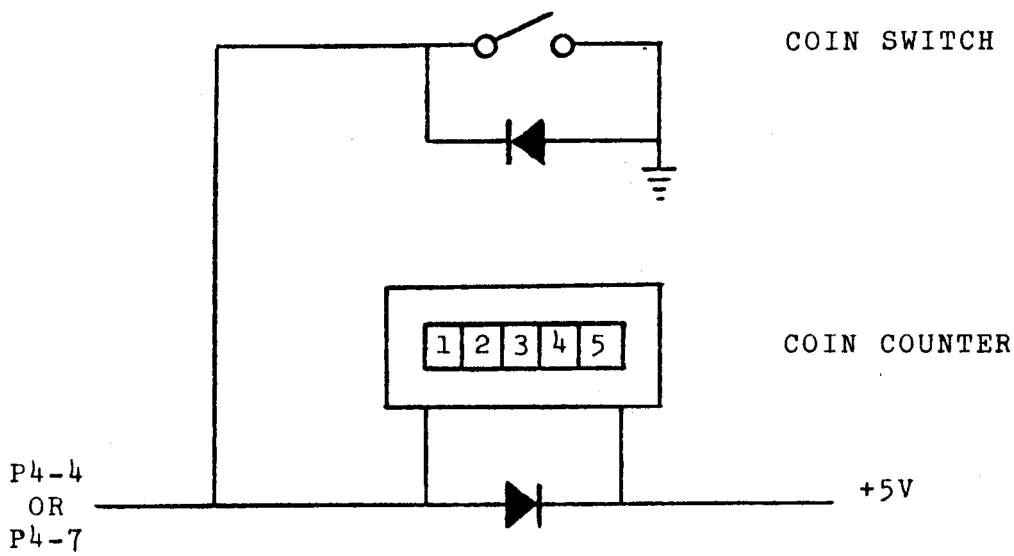
Do not use mechanical coin counters in any kit or dedicated game. These devices produce an inductive "kick" that will damage components on the circuit board(s). Problems caused by this are checkerboard video. A quick check to see if this is your problem is look at the "NMI not" signal on both Z80s (pin 17). If a low output is observed, try replacing U114 (74LS08) or if needed, U119 (74LS157).

The bookkeeping on our games is very accurate and includes number of coins dropped and dollars earned.

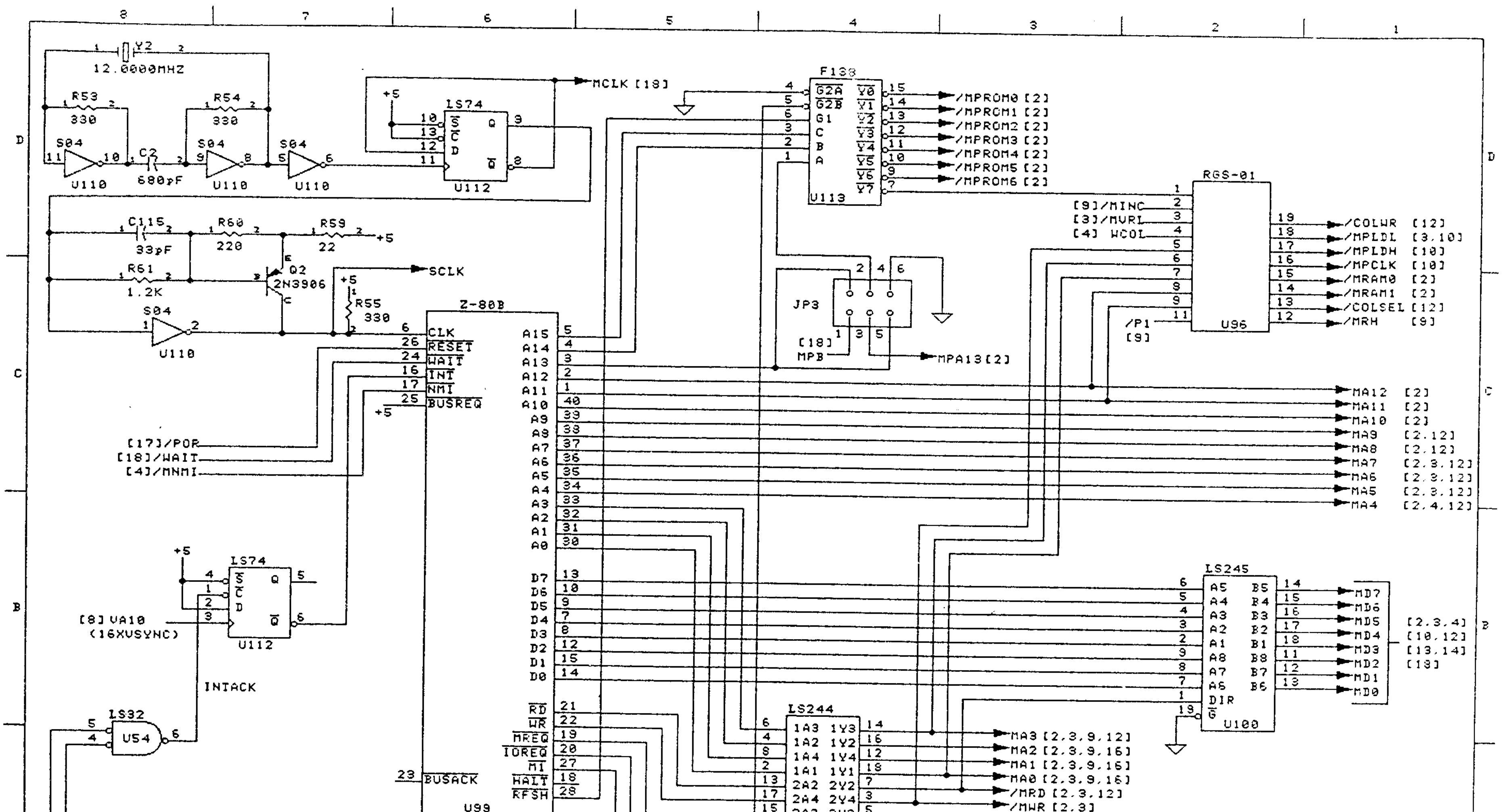
If you must install a coin counter, the next page shows a simple hookup using diode protection.

COIN COUNTER SURGE PROTECTION CIRCUIT

* IF YOU MUST INSTALL A COIN COUNTER



DIODE MAY BE 1N4001 THROUGH 1N4003

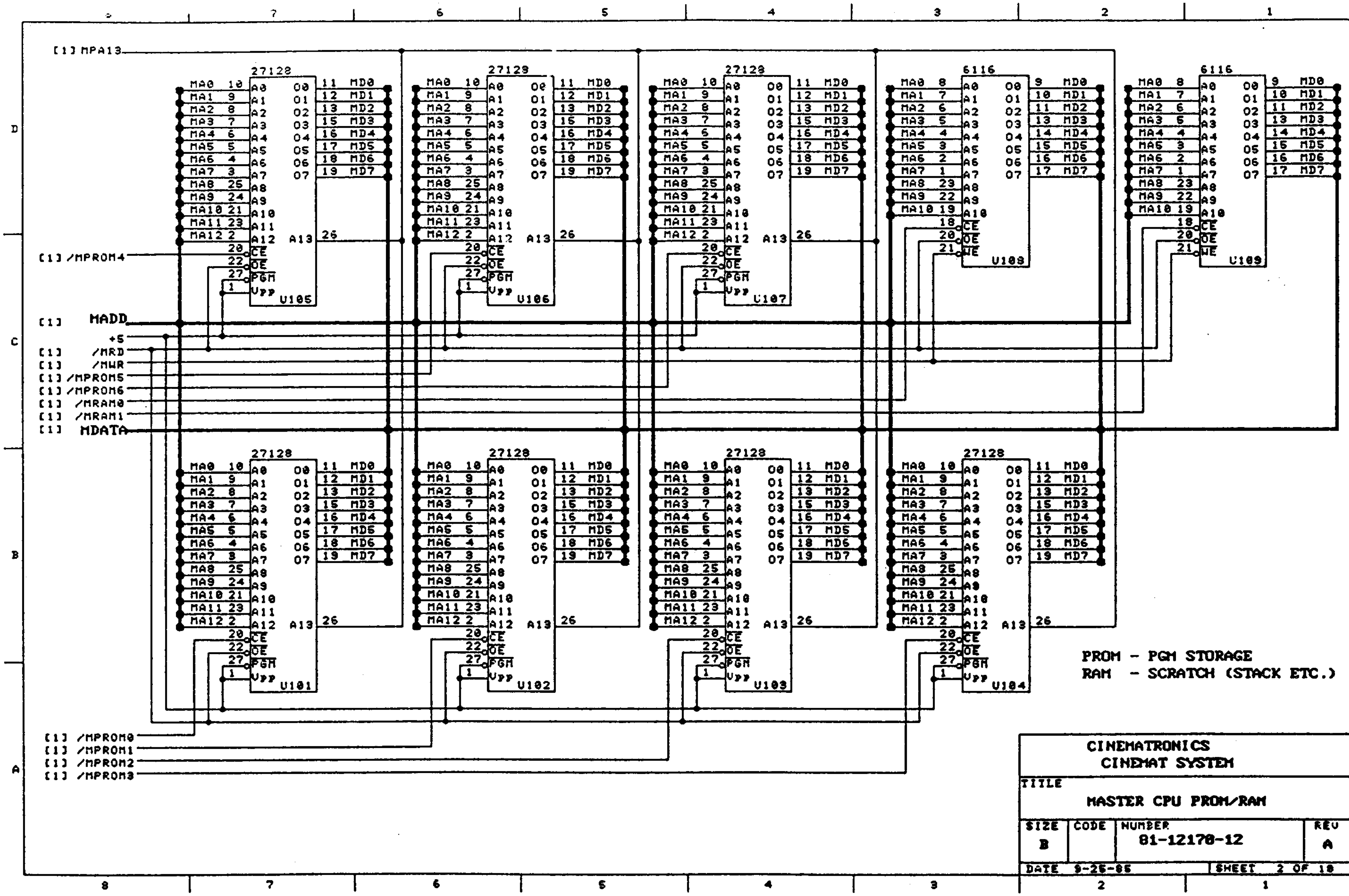


CINEMATRONICS
CINEMAT SYSTEM

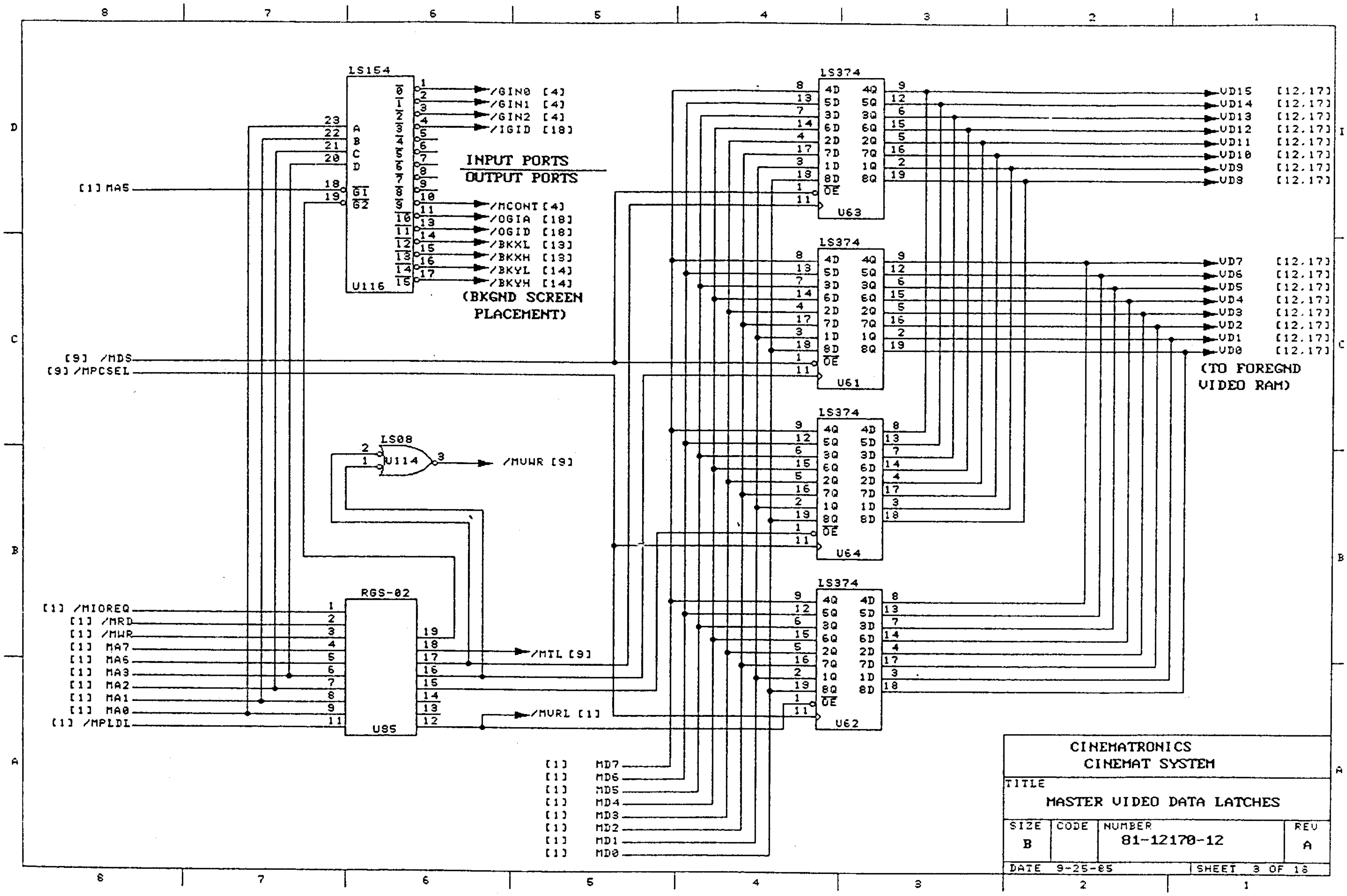
TITLE: MASTER CPU

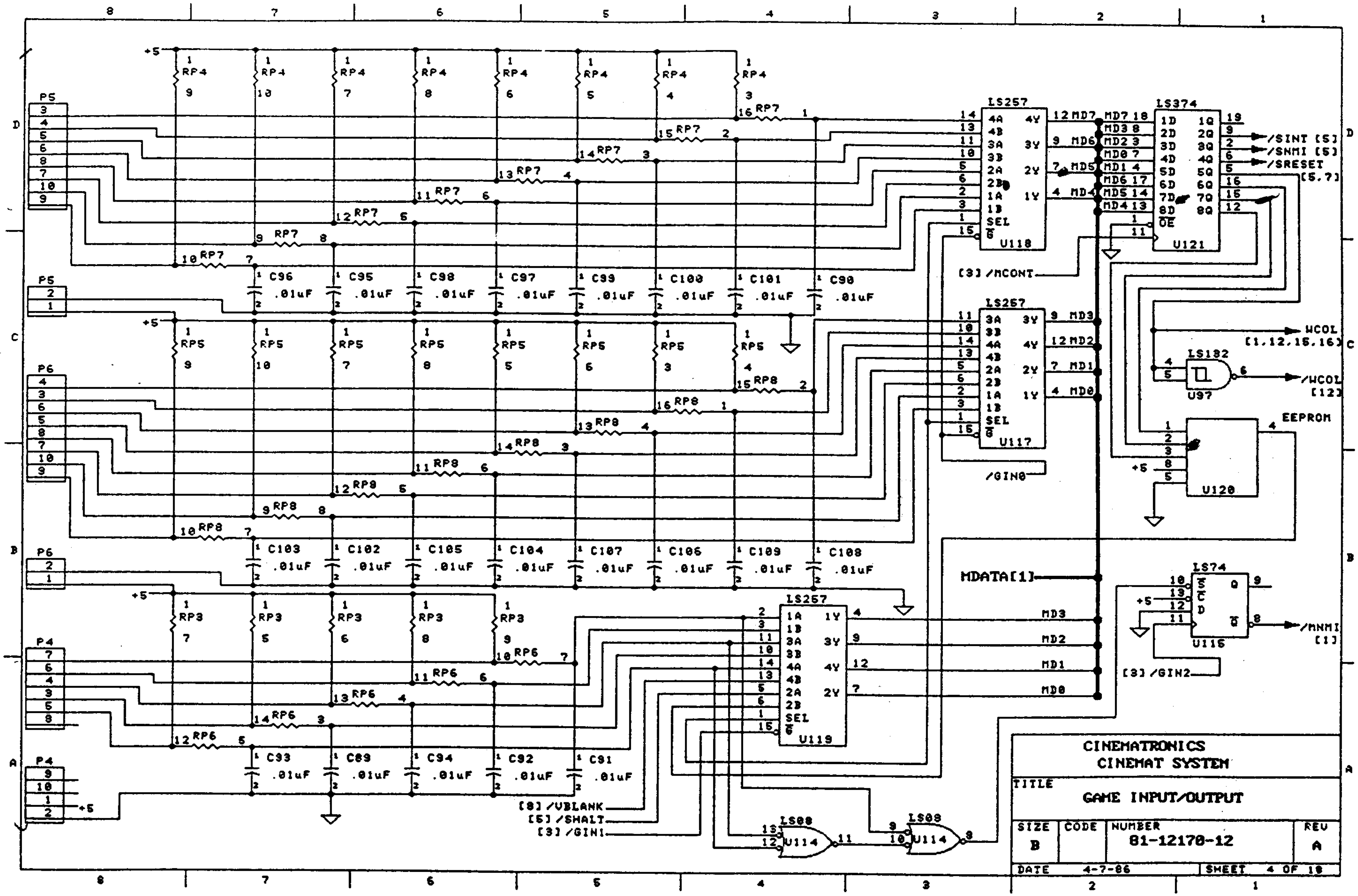
SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 SHEET 1 OF 18



[1] MPA13
[1] /MPROM4
[1] MADD
+5
[1] /MRD
[1] /MWR
[1] /MPROM5
[1] /MPROM6
[1] /MRAM0
[1] /MRAM1
[1] MDATA
[1] /MPROM0
[1] /MPROM1
[1] /MPROM2
[1] /MPROM3
27128 U105
27128 U106
27128 U107
6116 U108
6116 U109
27128 U101
27128 U102
27128 U103
27128 U104
PROM - PGM STORAGE
RAM - SCRATCH (STACK ETC.)
CINEMATRONICS
CINEMAT SYSTEM
TITLE
MASTER CPU PROM/RAM
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-86
SHEET 2 OF 18


LS154
U116
/GIN0 [4]
/GIN1 [4]
/GIN2 [4]
/IGID [18]
INPUT PORTS
OUTPUT PORTS
/MCONT [4]
/OGIA [18]
/OGID [18]
/BKXL [13]
/BKXH [13]
/BKYL [14]
/BKYH [14]
(BKGND SCREEN PLACEMENT)
[1] MA5
[9] /MDS
[9] /MPCSEL
LS08
U114
/MUWR [9]
RGS-02
U85
[1] /MIOREQ
[1] /MRD
[1] /MWR
[1] MA7
[1] MA6
[1] MA3
[1] MA2
[1] MA1
[1] MA0
[1] /MPLDL
/MTL [9]
/MURL [1]
LS374
U63
U61
U64
U62
VD15 [12,17]
VD14 [12,17]
VD13 [12,17]
VD12 [12,17]
VD11 [12,17]
VD10 [12,17]
VD9 [12,17]
VD8 [12,17]
VD7 [12,17]
VD6 [12,17]
VD5 [12,17]
VD4 [12,17]
VD3 [12,17]
VD2 [12,17]
VD1 [12,17]
VD0 [12,17]
(TO FOREGND VIDEO RAM)
[1] MD7
[1] MD6
[1] MD5
[1] MD4
[1] MD3
[1] MD2
[1] MD1
[1] MD0
CINEMATRONICS
CINEMAT SYSTEM
TITLE
MASTER VIDEO DATA LATCHES
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-85
SHEET 3 OF 18

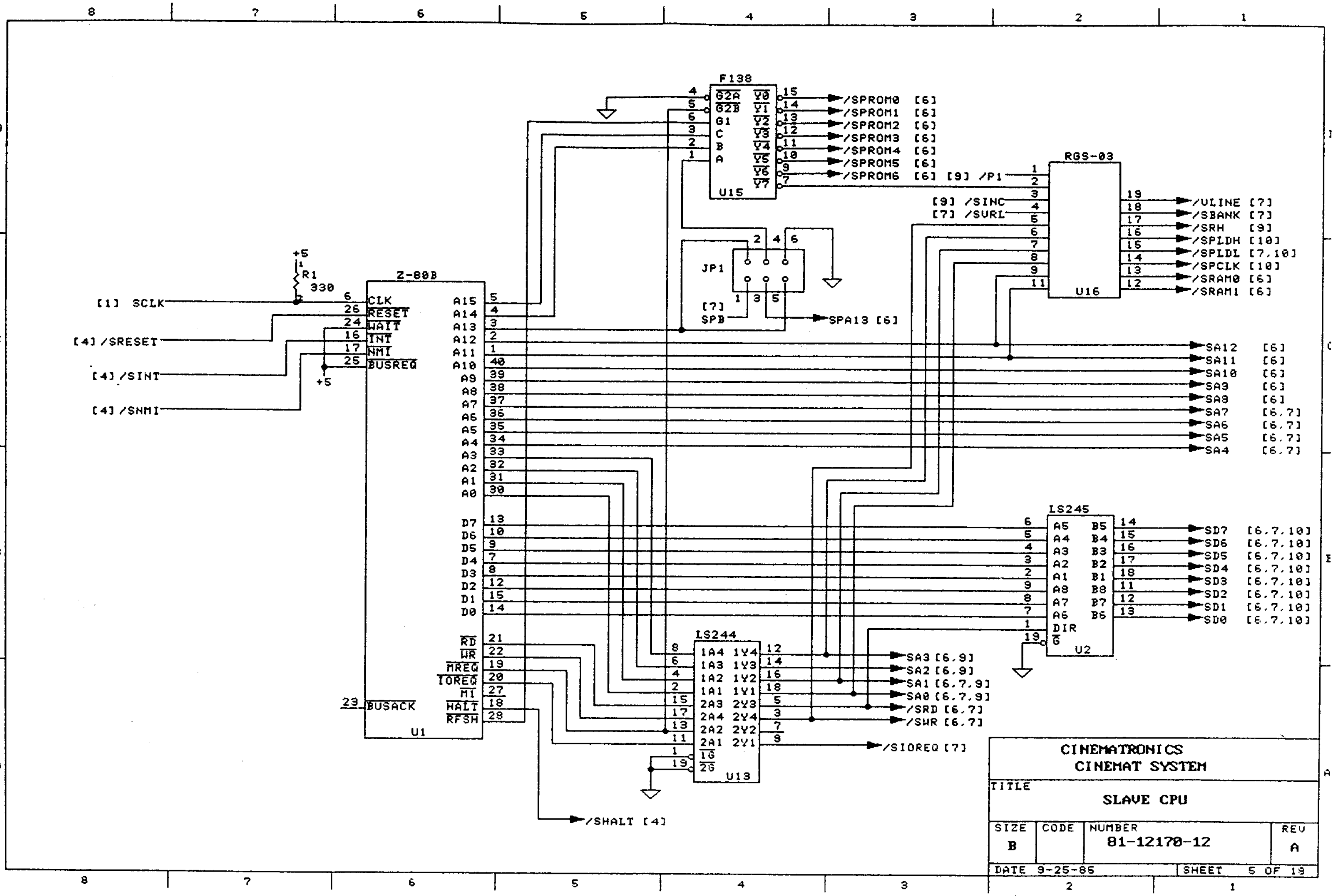


CINEMATRONICS
CINEMAT SYSTEM

TITLE: GAME INPUT/OUTPUT

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 4-7-86 SHEET 4 OF 18

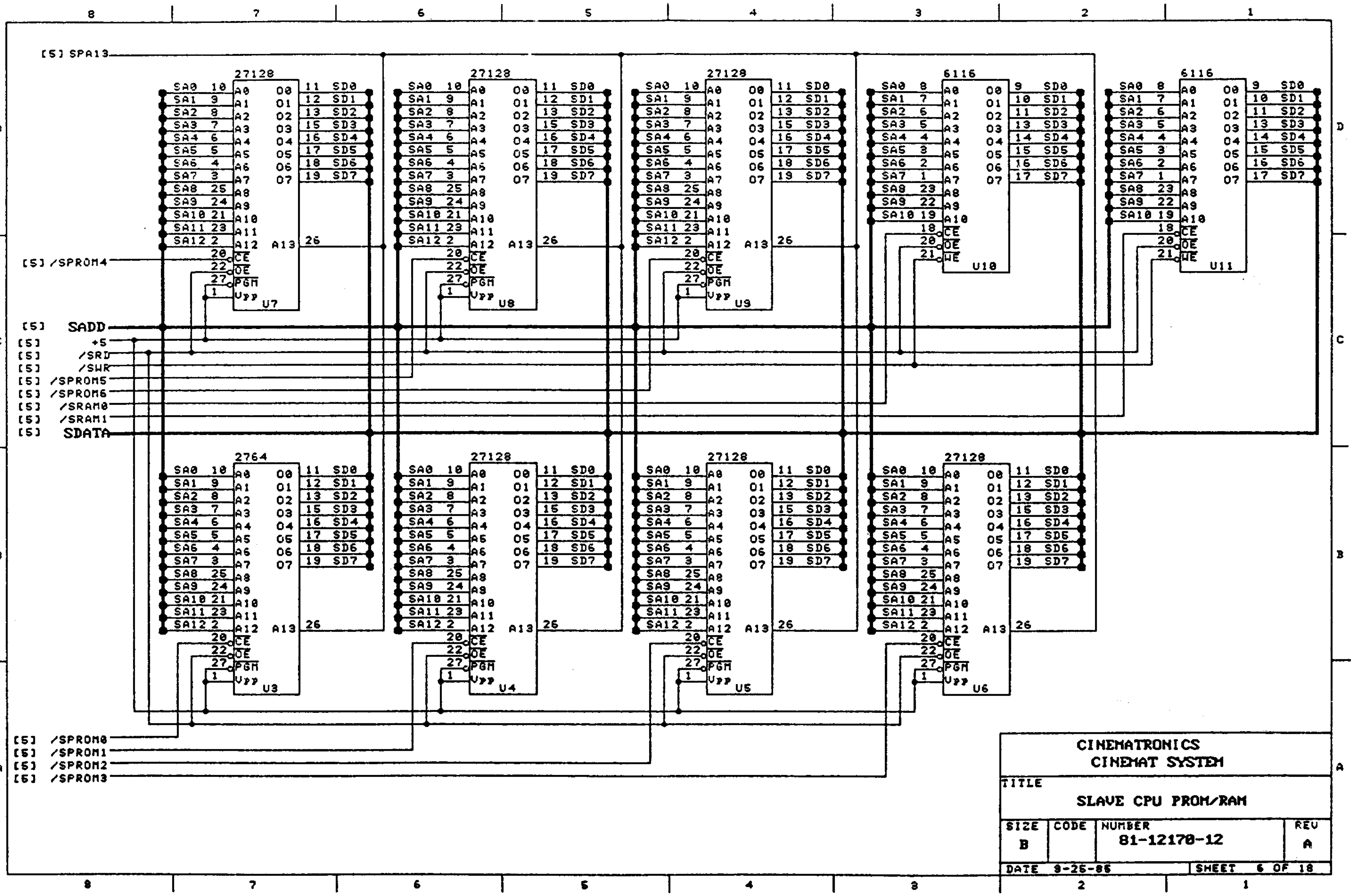


CINEMATRONICS
CINEMAT SYSTEM

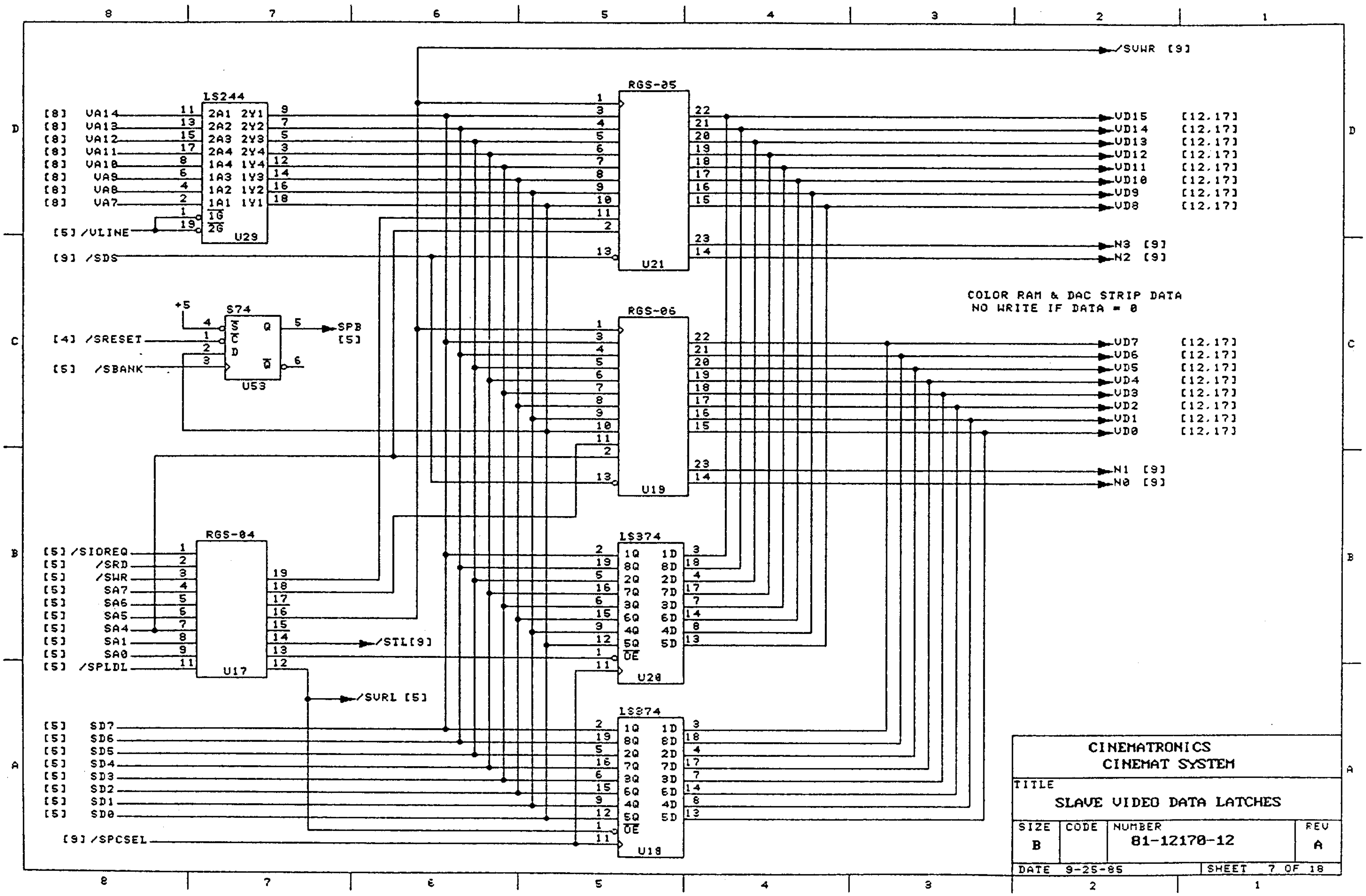
TITLE: SLAVE CPU

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 SHEET 5 OF 19



[5] SPA13
[5] /SPROM4
[5] SADD
[5] +5
[5] /SRD
[5] /SWR
[5] /SPROM5
[5] /SPROM6
[5] /SRAM0
[5] /SRAM1
[5] SDATA
[5] /SPROM0
[5] /SPROM1
[5] /SPROM2
[5] /SPROM3
27128 U7
27128 U8
27128 U9
6116 U10
6116 U11
2764 U3
27128 U4
27128 U5
27128 U6
SA0 SA1 SA2 SA3 SA4 SA5 SA6 SA7 SA8 SA9 SA10 SA11 SA12
SD0 SD1 SD2 SD3 SD4 SD5 SD6 SD7
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13
O0 O1 O2 O3 O4 O5 O6 O7
CE OE PGM Vpp WE
CINEMATRONICS
CINEMAT SYSTEM
TITLE
SLAVE CPU PROM/RAM
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-85
SHEET 6 OF 18

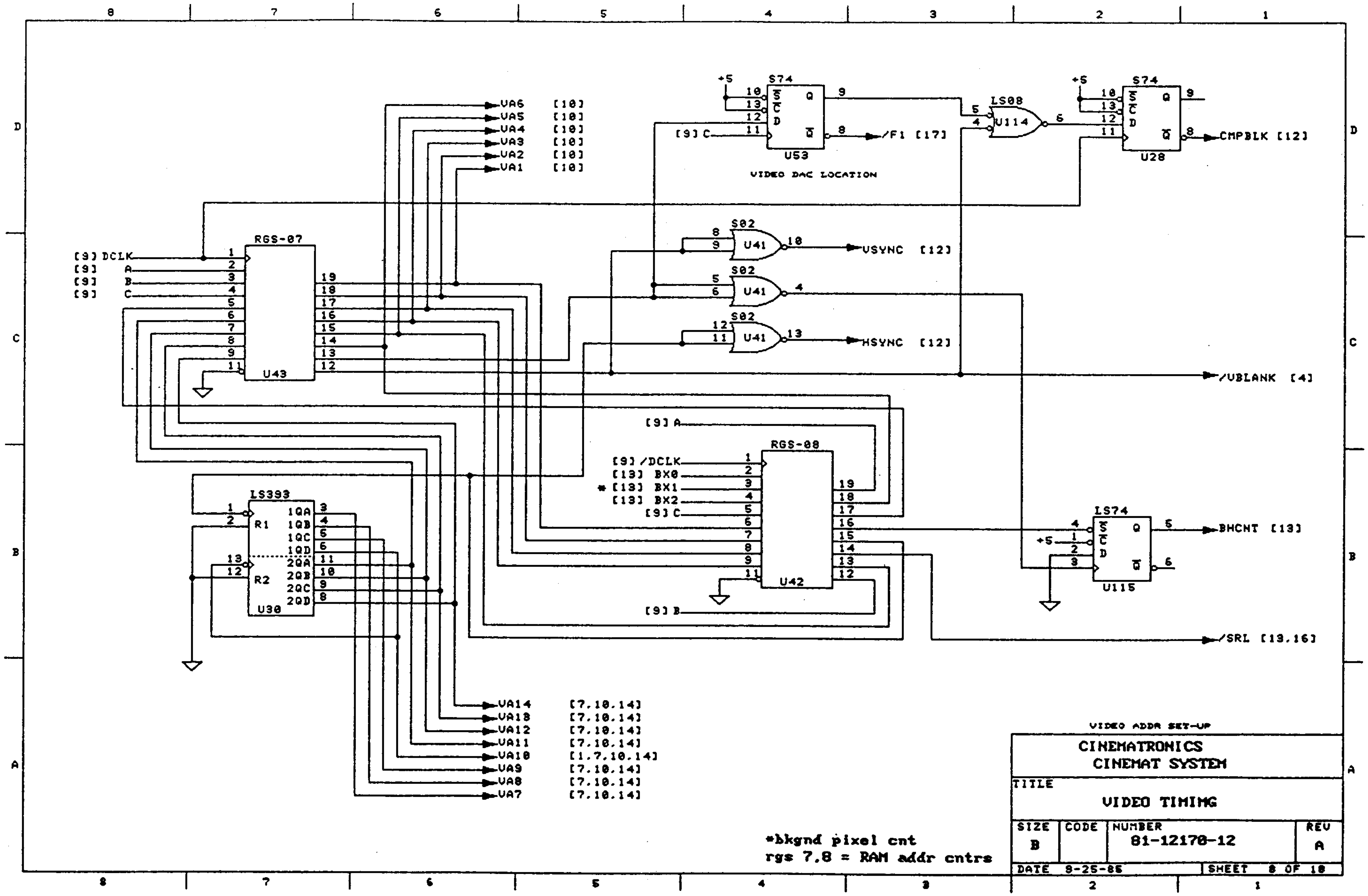


CINEMATRONICS
CINEMAT SYSTEM

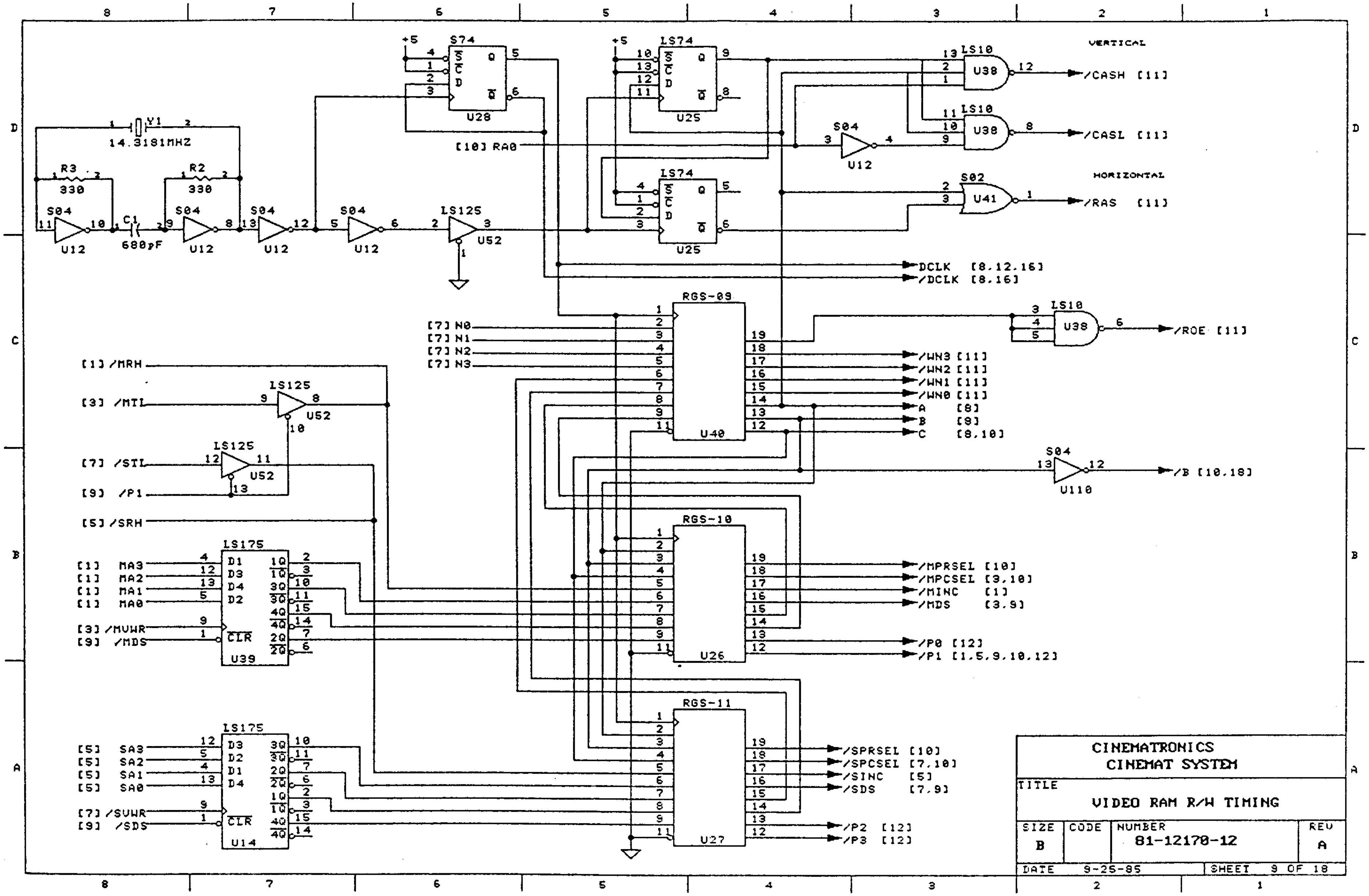
TITLE
SLAVE VIDEO DATA LATCHES

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 SHEET 7 OF 18



RGS-07
U43
RGS-08
U42
LS393
U30
S74
U53
S74
U28
LS08
U114
S02
U41
LS74
U115
[9] DCLK
[9] A
[9] B
[9] C
[9] /DCLK
[13] BX0
* [13] BX1
[13] BX2
VA6 [10]
VA5 [10]
VA4 [10]
VA3 [10]
VA2 [10]
VA1 [10]
/F1 [17]
CMPBLK [12]
VIDEO DAC LOCATION
VSYNC [12]
HSYNC [12]
/VBLANK [4]
BHCNT [13]
/SRL [13,16]
VA14 [7,10,14]
VA13 [7,10,14]
VA12 [7,10,14]
VA11 [7,10,14]
VA10 [1,7,10,14]
VA9 [7,10,14]
VA8 [7,10,14]
VA7 [7,10,14]
*bkgnd pixel cnt
rgs 7,8 = RAM addr cntrs
VIDEO ADDR SET-UP
CINEMATRONICS
CINEMAT SYSTEM
TITLE
VIDEO TIMING
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-85
SHEET 8 OF 18

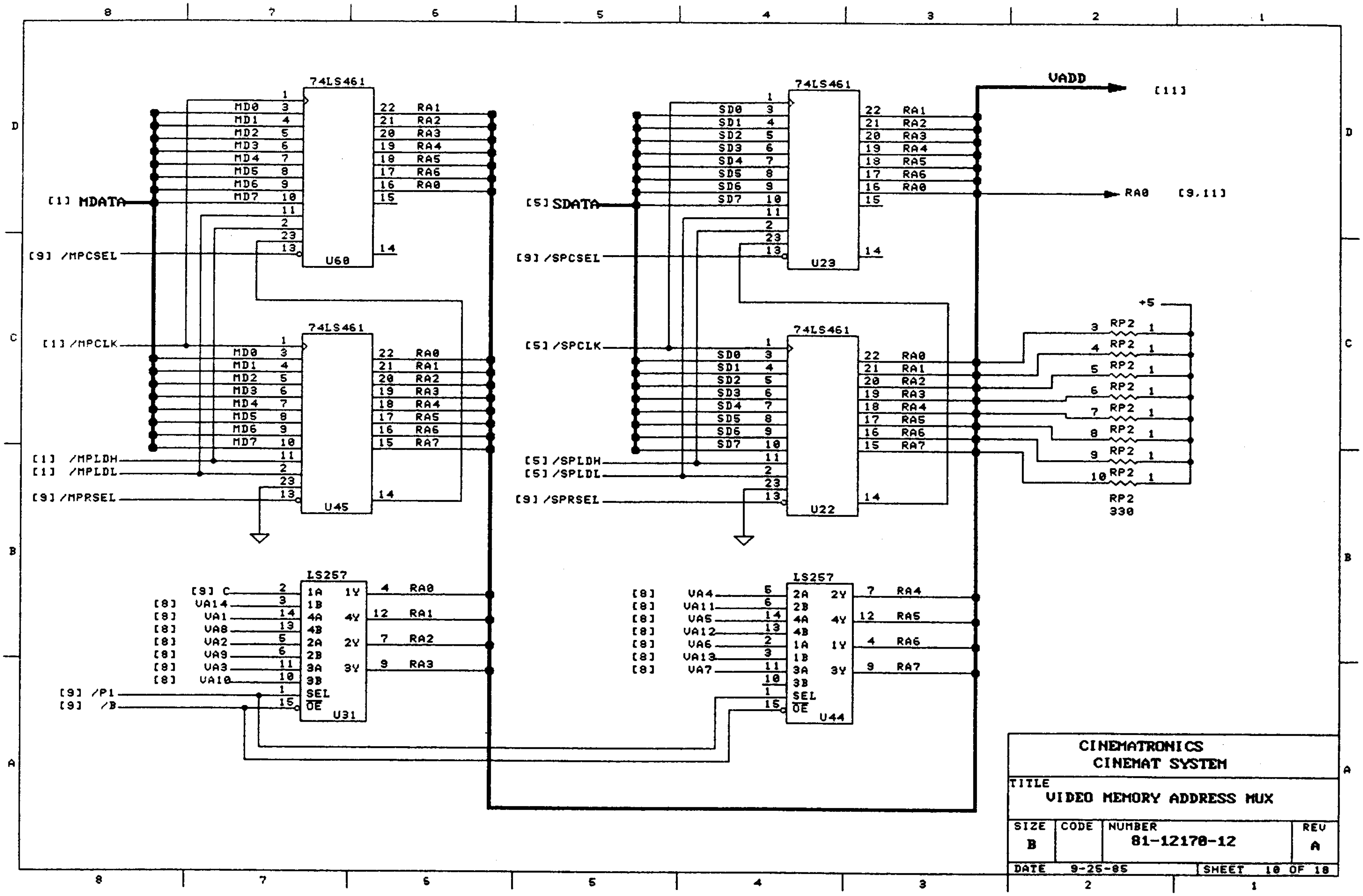


CINEMATRONICS
CINEMAT SYSTEM

TITLE: VIDEO RAM R/W TIMING

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 — SHEET 9 OF 18

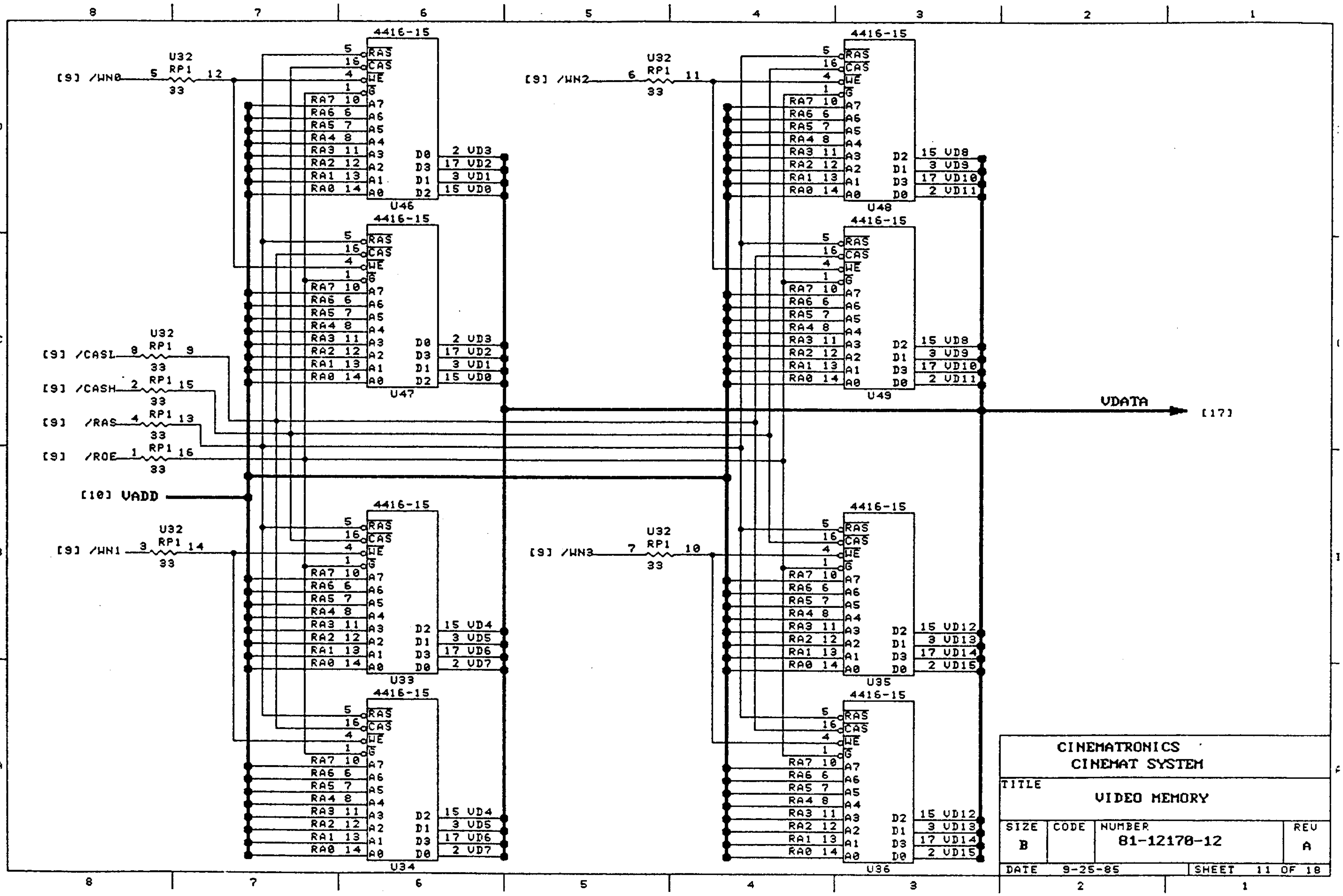


CINEMATRONICS
CINEMAT SYSTEM

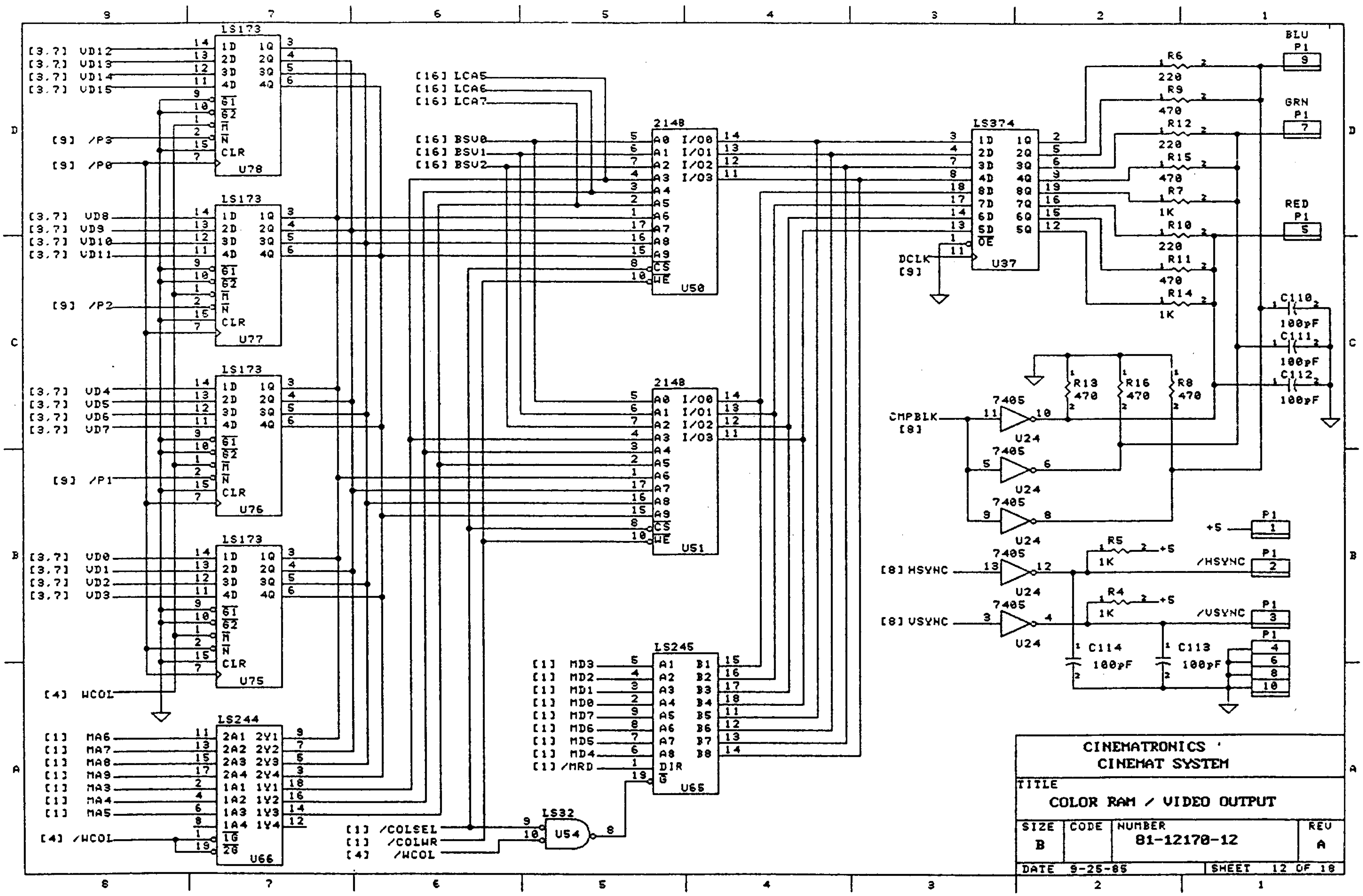
TITLE
VIDEO MEMORY ADDRESS MUX

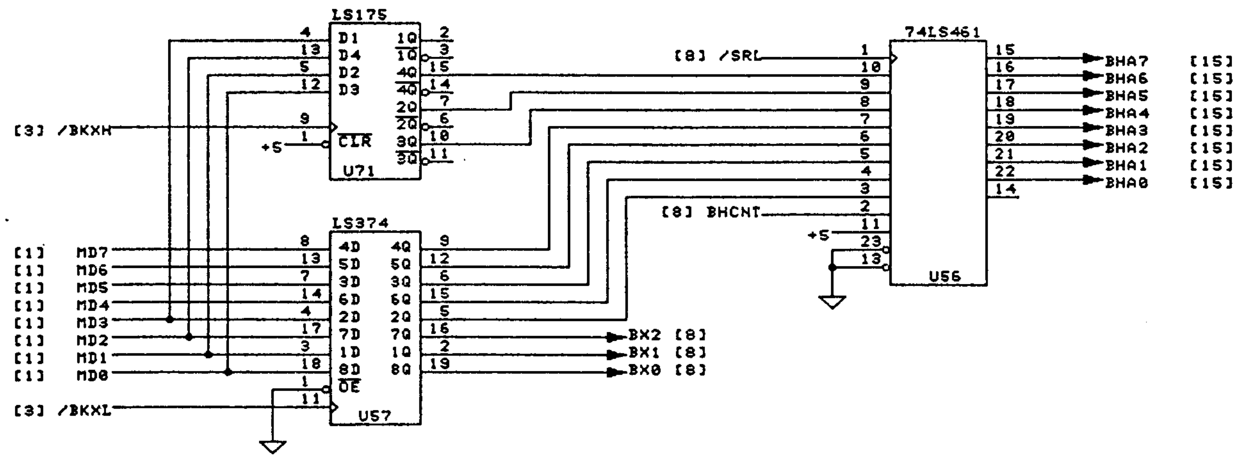
SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 | SHEET 10 OF 18

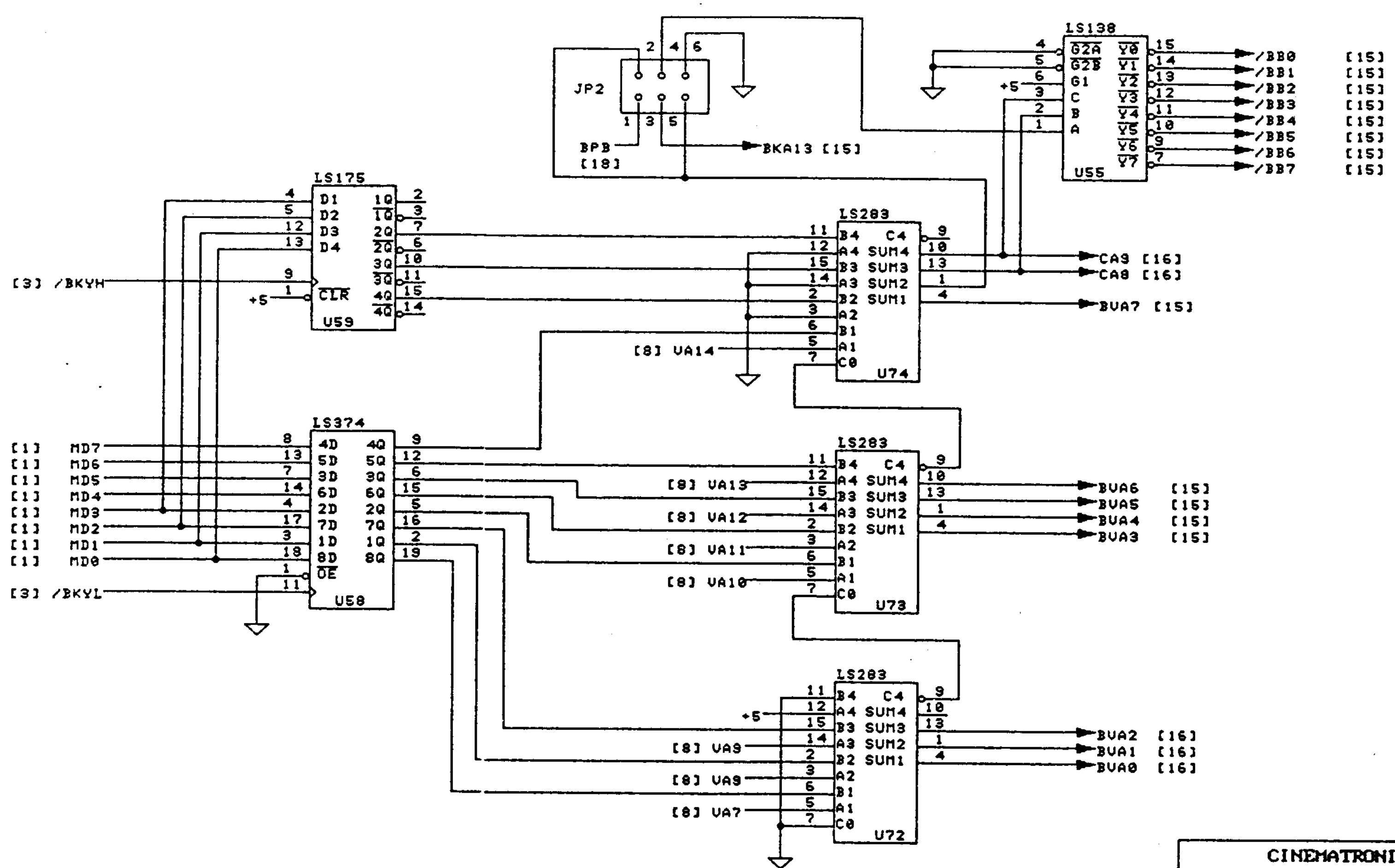


CINEMATRONICS CINEMAT SYSTEM			
TITLE	VIDEO MEMORY		
SIZE B	CODE	NUMBER 81-12170-12	REV A
DATE 9-25-85		SHEET 11 OF 18	


CINEMATRONICS '
CINEMAT SYSTEM
TITLE
COLOR RAM / VIDEO OUTPUT
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-85
SHEET 12 OF 18
LS173
U78
U77
U76
U75
LS244
U66
2148
U50
U51
LS374
U37
LS245
U65
LS32
U54
7405
U24
BLU
GRN
RED
P1
R6 220
R9 470
R12 220
R15 470
R7 1K
R10 220
R11 470
R14 1K
R13 470
R16 470
R8 470
R5 1K
R4 1K
C110 100pF
C111 100pF
C112 100pF
C114 100pF
C113 100pF
CMPBLK [8]
DCLK [9]
[8] HSYNC
[8] VSYNC
/HSYNC
/VSYNC
+5
[3,7] VD12
[3,7] VD13
[3,7] VD14
[3,7] VD15
[9] /P3
[9] /P0
[3,7] VD8
[3,7] VD9
[3,7] VD10
[3,7] VD11
[9] /P2
[3,7] VD4
[3,7] VD5
[3,7] VD6
[3,7] VD7
[9] /P1
[3,7] VD0
[3,7] VD1
[3,7] VD2
[3,7] VD3
[4] WCOL
[1] MA6
[1] MA7
[1] MA8
[1] MA9
[1] MA3
[1] MA4
[1] MA5
[4] /WCOL
[16] LCA5
[16] LCA6
[16] LCA7
[16] BSV0
[16] BSV1
[16] BSV2
[1] /COLSEL
[1] /COLWR
[4] /WCOL
[1] MD3
[1] MD2
[1] MD1
[1] MD0
[1] MD7
[1] MD6
[1] MD5
[1] MD4
[1] /MRD



CINEMATRONICS CINEMAT SYSTEM			
TITLE BACKGROUND HORIZONTAL ADDRESS			
SIZE B	CODE	NUMBER 81-12170-12	REV A
DATE 9-25-85		SHEET 19 OF 19	

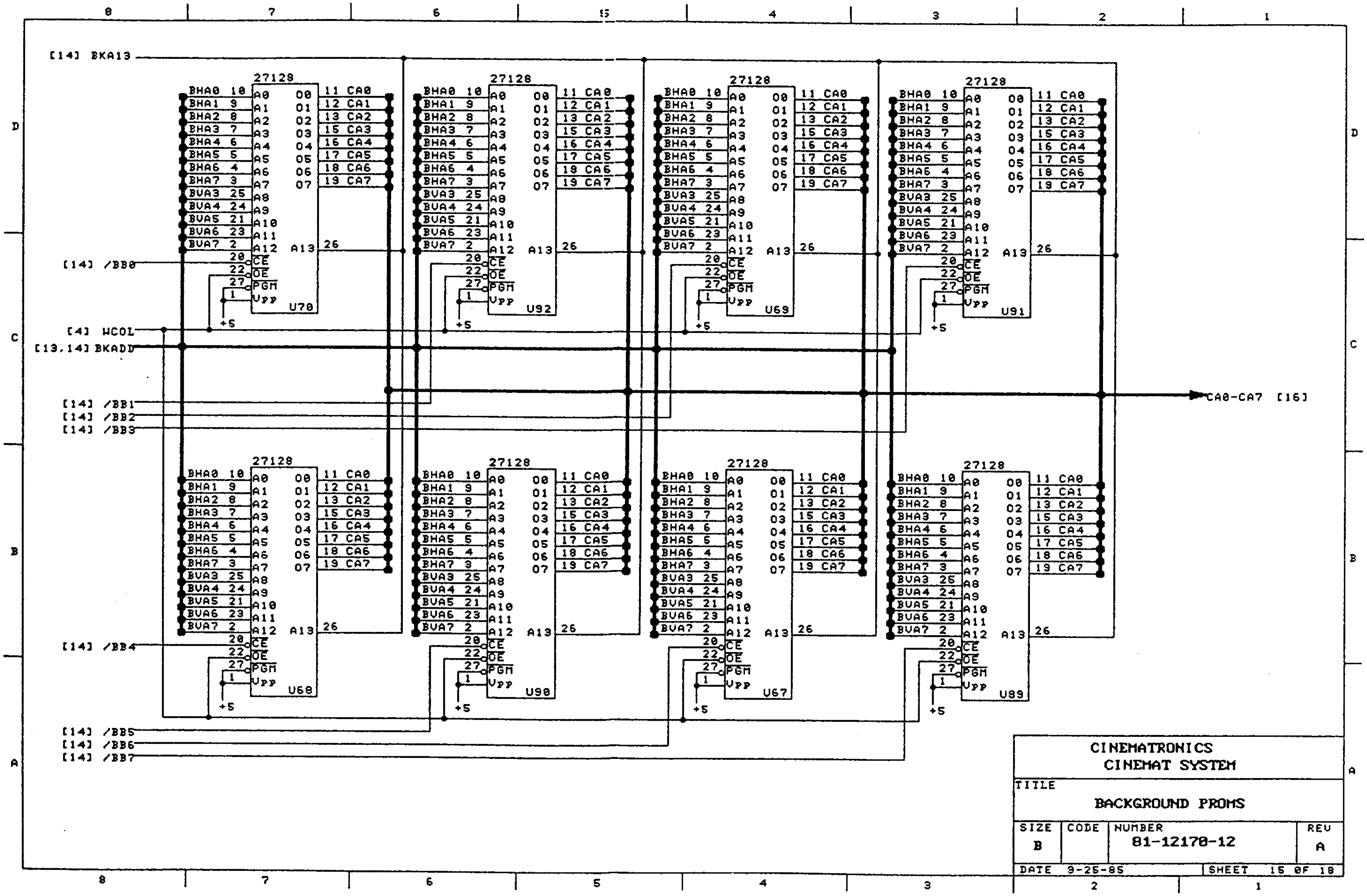


CINEMATRONICS
CINEMAT SYSTEM

TITLE
BACKGROUND VERTICAL ADDRESS

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 SHEET 14 OF 18

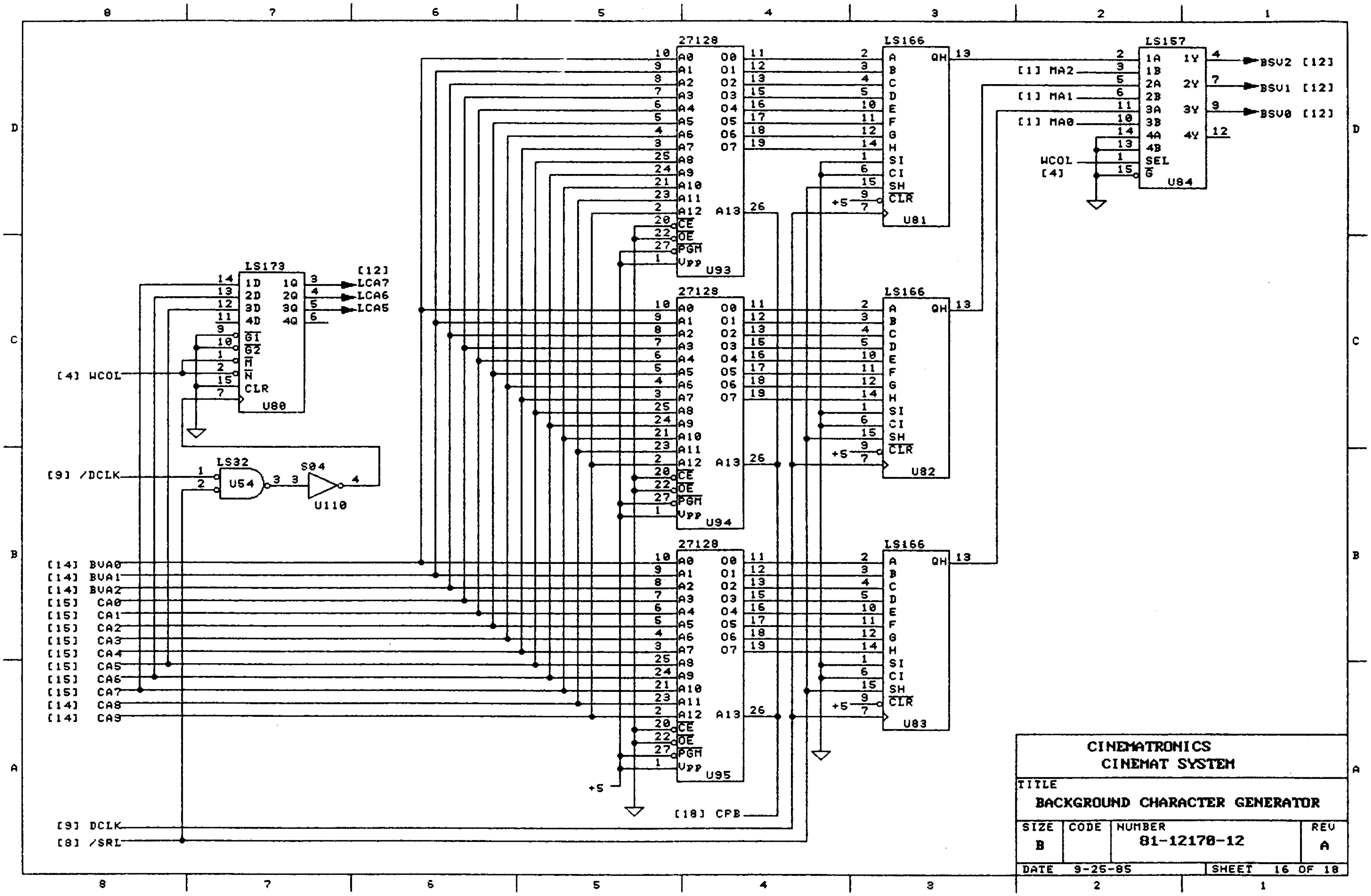


CINEMATRONICS
CINEMAT SYSTEM

TITLE
BACKGROUND PROMS

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

DATE 9-25-85 SHEET 15 OF 18

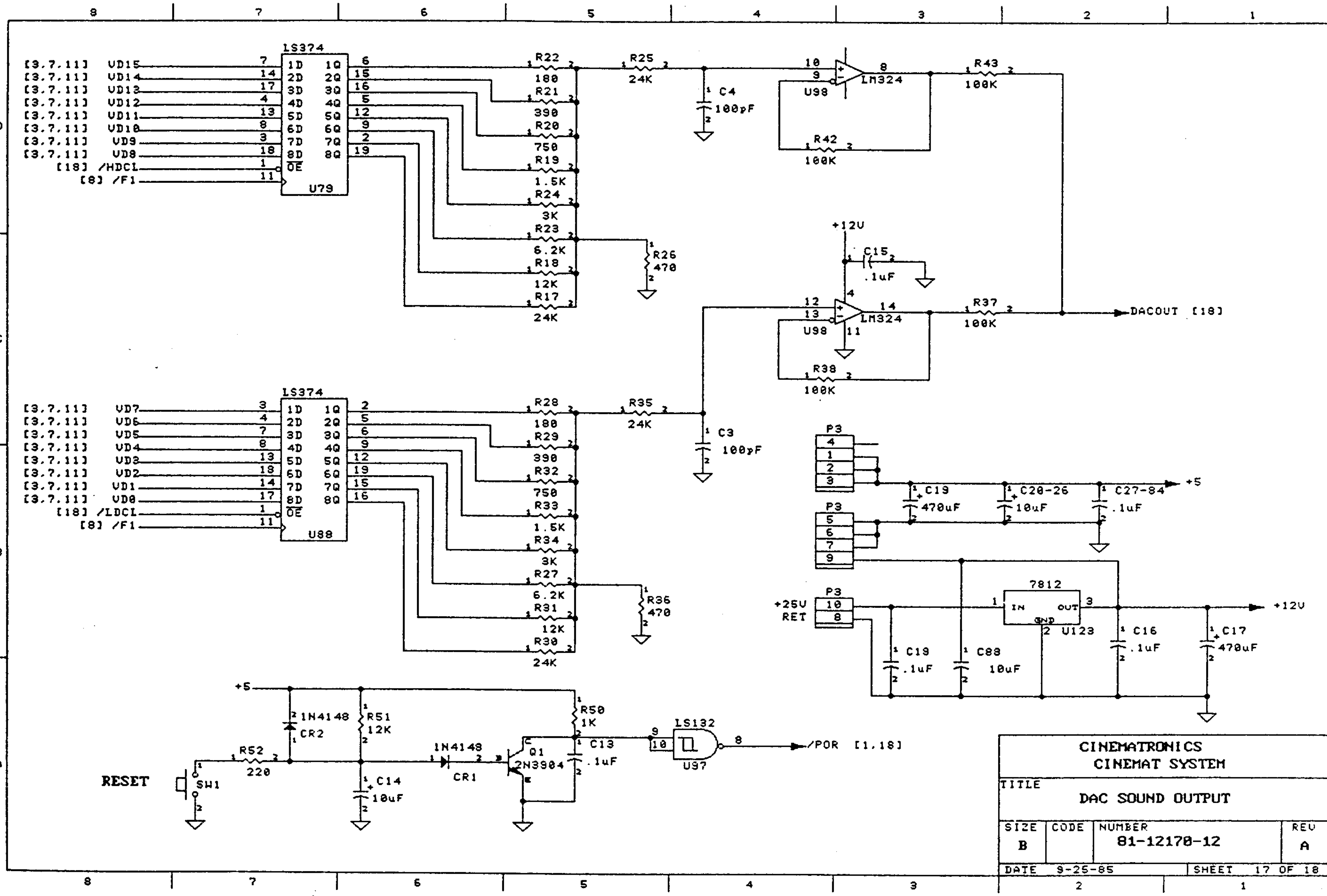


CINEMATRONICS
CINEMAT SYSTEM

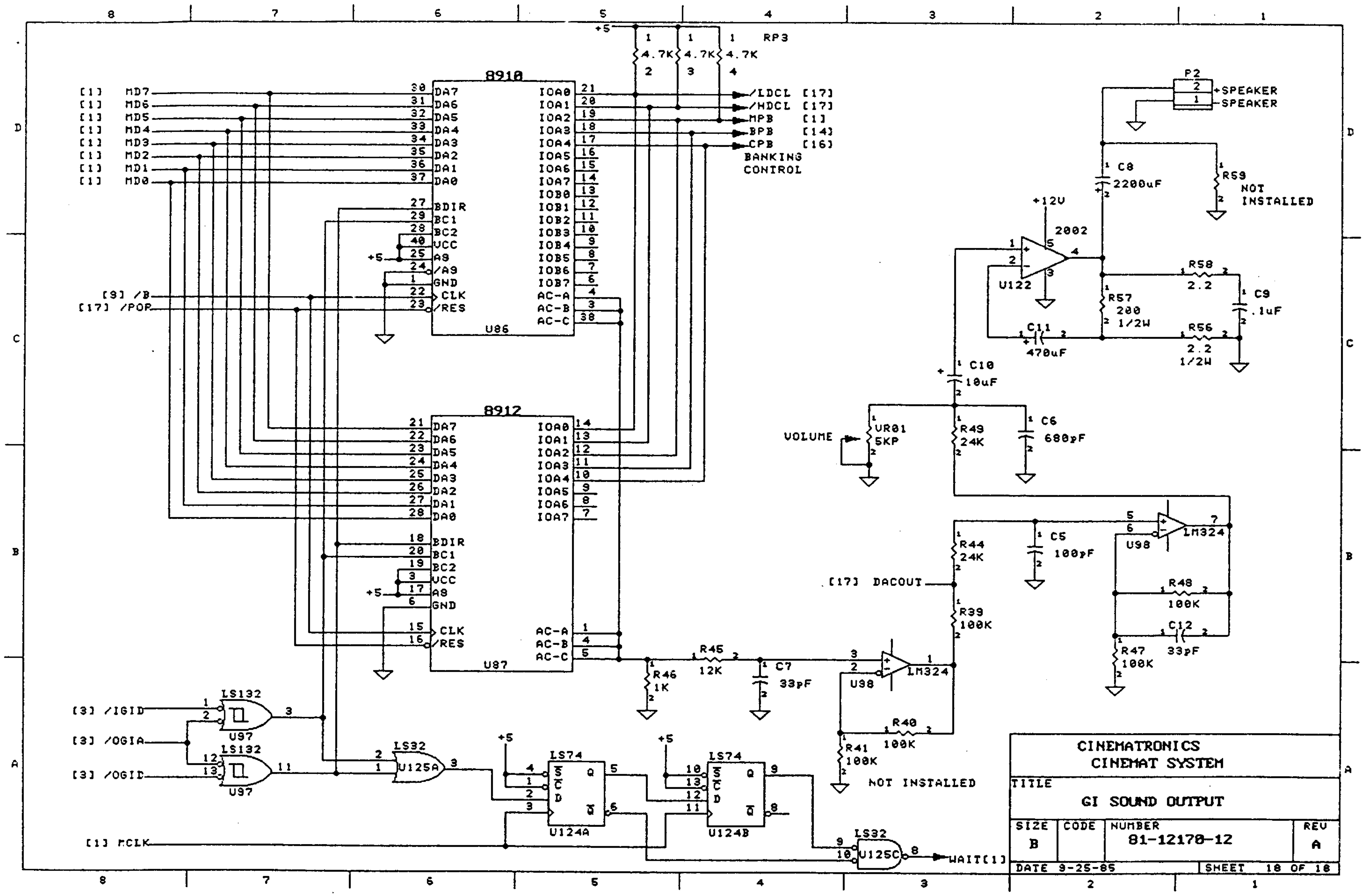
TITLE
BACKGROUND CHARACTER GENERATOR

SIZE	CODE	NUMBER	REV
B		81-12170-12	A

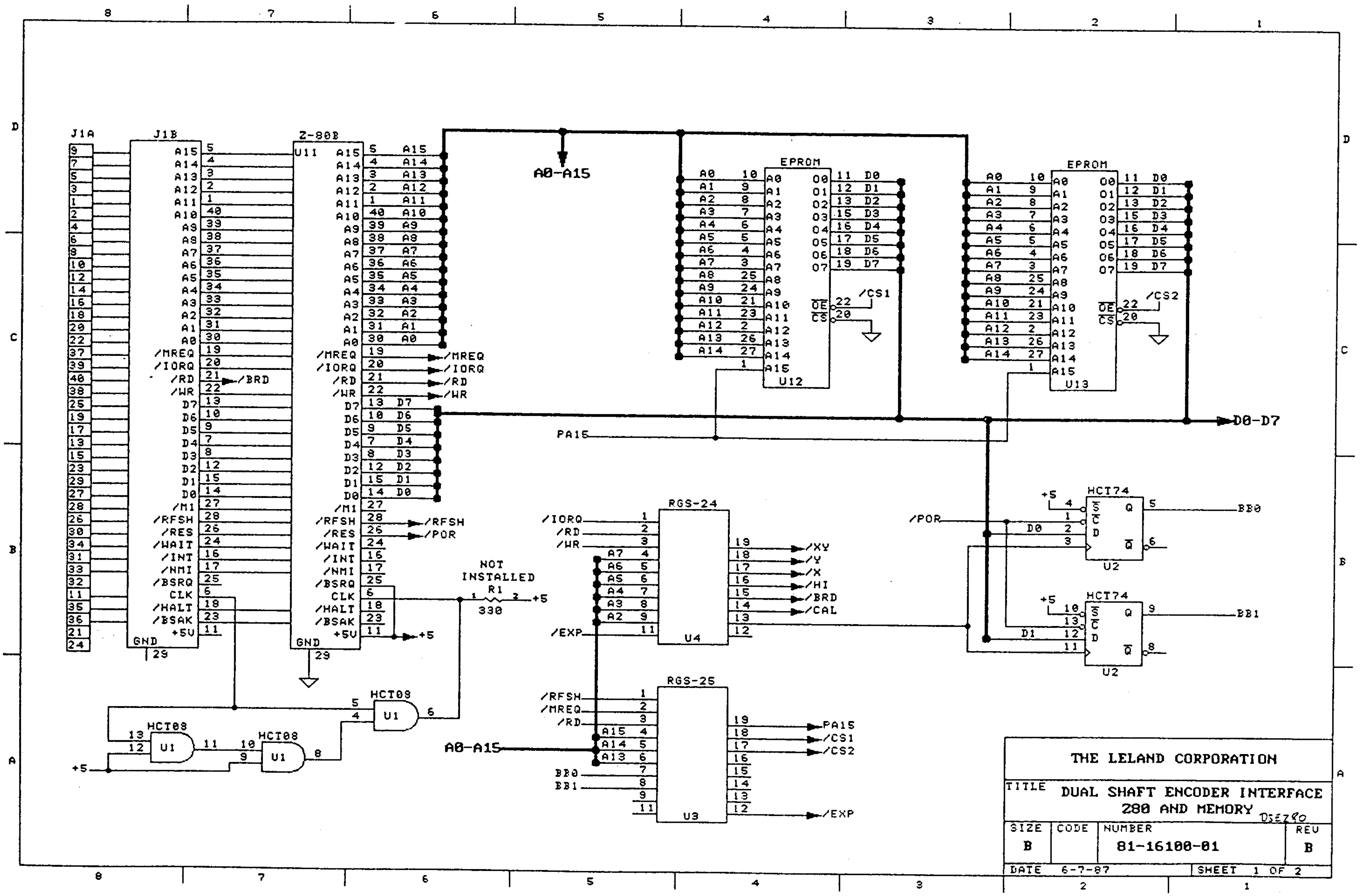
DATE 9-25-85 SHEET 16 OF 18

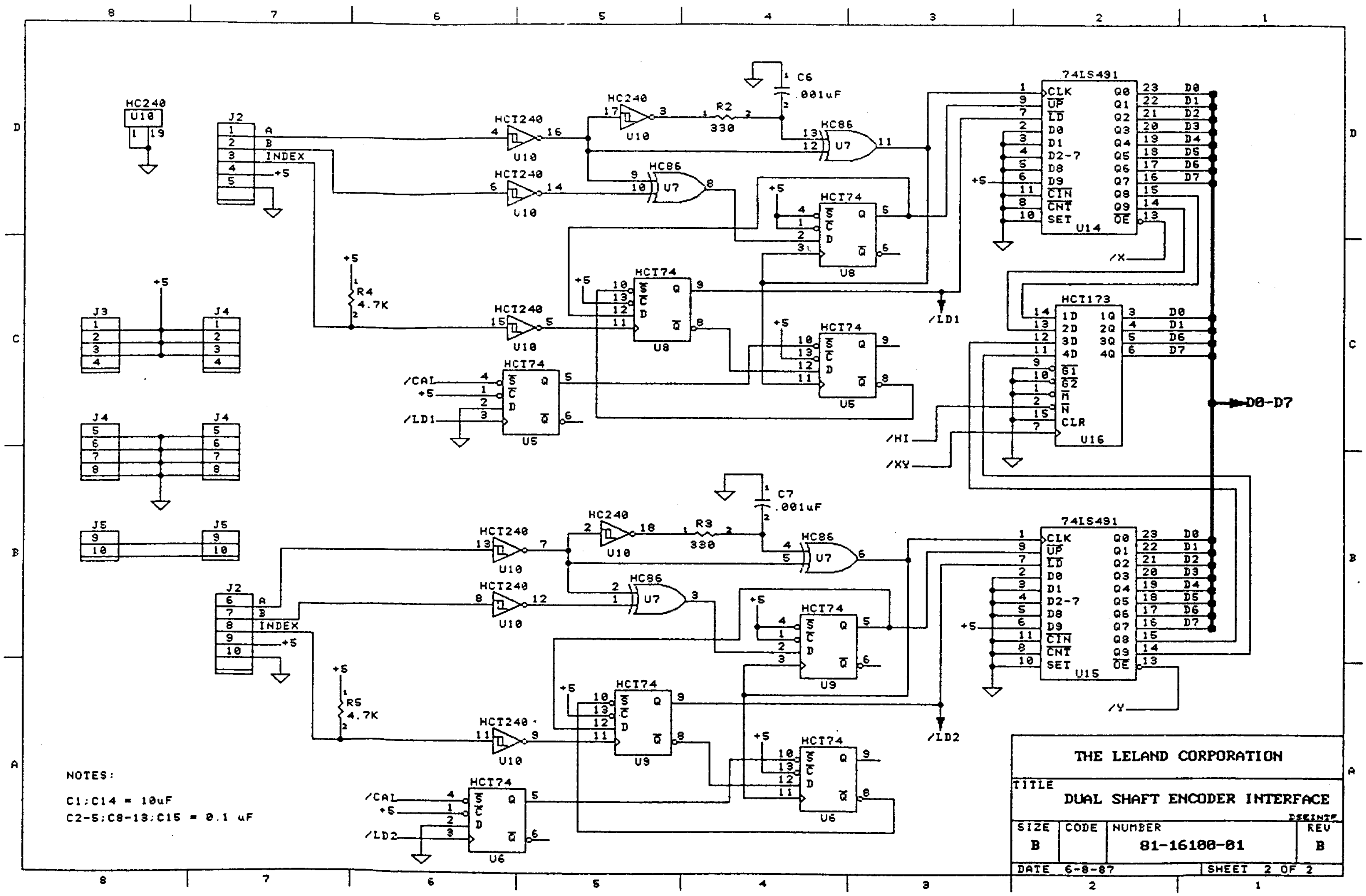


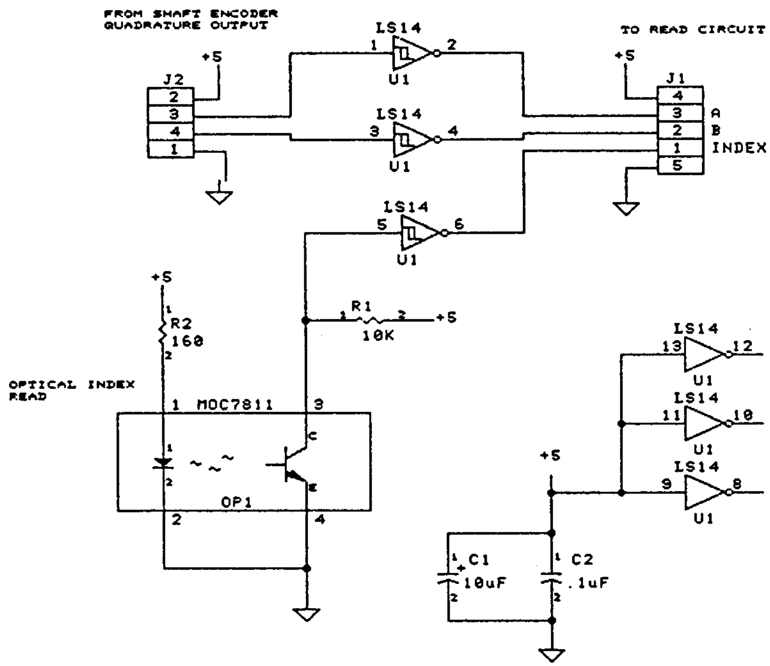
8 7 6 5 4 3 2 1
D C B A
LS374
[3,7,11] VD15
[3,7,11] VD14
[3,7,11] VD13
[3,7,11] VD12
[3,7,11] VD11
[3,7,11] VD10
[3,7,11] VD9
[3,7,11] VD8
[18] /HDCL
[8] /F1
U79
R22 180
R21 390
R20 750
R19 1.5K
R24 3K
R23 6.2K
R18 12K
R17 24K
R25 24K
R26 470
C4 100pF
U98 LM324
R42 100K
R43 100K
+12V
C15 .1uF
R37 100K
R38 100K
DACOUT [18]
LS374
[3,7,11] VD7
[3,7,11] VD6
[3,7,11] VD5
[3,7,11] VD4
[3,7,11] VD3
[3,7,11] VD2
[3,7,11] VD1
[3,7,11] VD0
[18] /LDCL
[8] /F1
U80
R28 180
R29 390
R32 750
R33 1.5K
R34 3K
R27 6.2K
R31 12K
R30 24K
R35 24K
R36 470
C3 100pF
P3
C19 470uF
C20-26 10uF
C27-84 .1uF
+5
7812
IN OUT GND
U123
+25V
RET
C18 .1uF
C88 10uF
C16 .1uF
C17 470uF
+12V
+5
1N4148 CR2
R51 12K
R50 1K
R52 220
RESET
SW1
C14 10uF
1N4148 CR1
Q1 2N3904
C13 .1uF
LS132
U97
/POR [1,18]
CINEMATRONICS
CINEMAT SYSTEM
TITLE
DAC SOUND OUTPUT
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-85
SHEET 17 OF 18



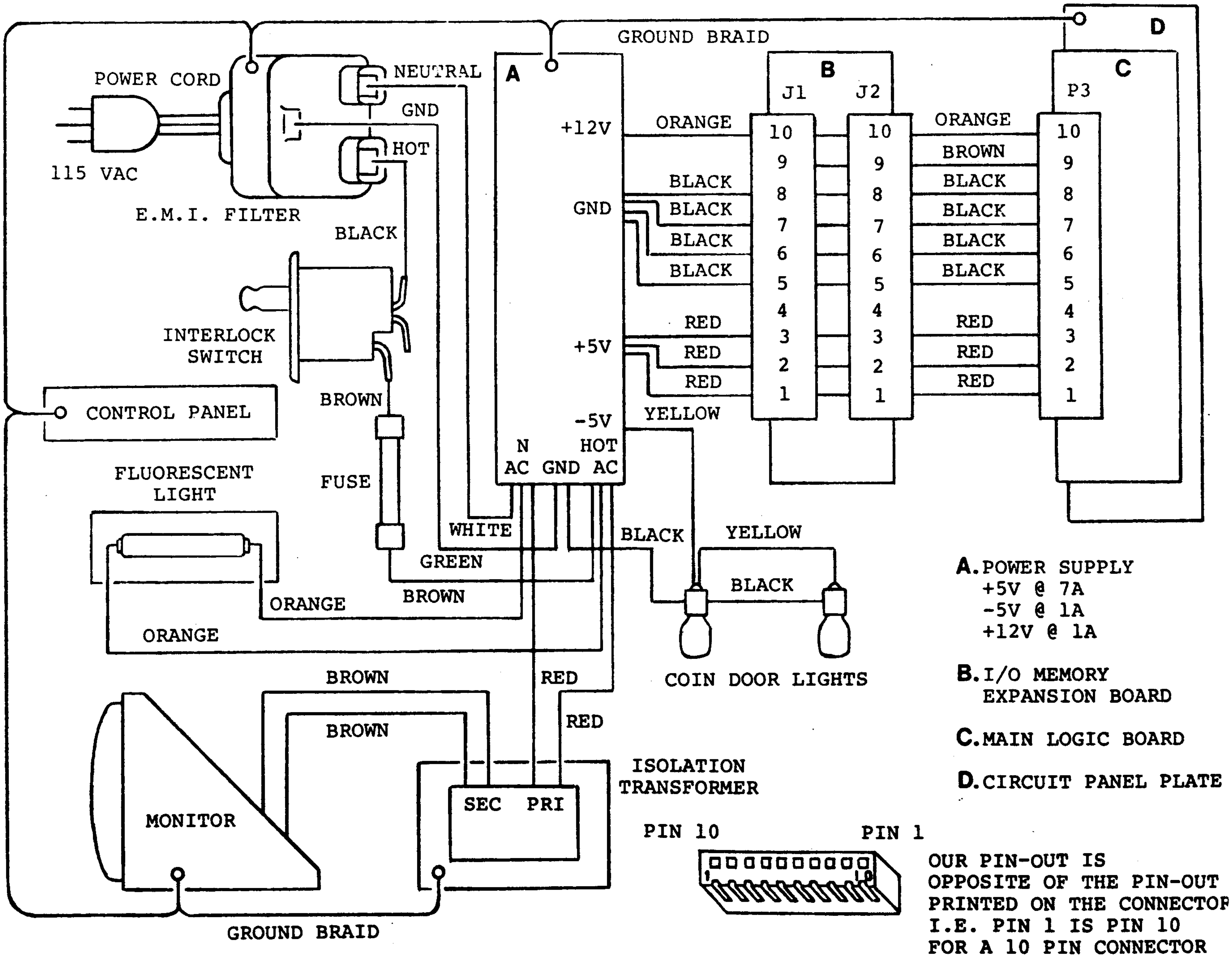
8910
U86
8912
U87
[1] MD7
[1] MD6
[1] MD5
[1] MD4
[1] MD3
[1] MD2
[1] MD1
[1] MD0
[9] /B
[17] /POP
DA7 DA6 DA5 DA4 DA3 DA2 DA1 DA0
BDIR BC1 BC2 VCC A8 /A9 GND CLK /RES
IOA0 IOA1 IOA2 IOA3 IOA4 IOA5 IOA6 IOA7
IOB0 IOB1 IOB2 IOB3 IOB4 IOB5 IOB6 IOB7
AC-A AC-B AC-C
+5
RP3
4.7K
/LDCL [17]
/HDCL [17]
MPB [1]
BPB [14]
CPB [16]
BANKING CONTROL
P2
+SPEAKER
-SPEAKER
C8 2200uF
R59 NOT INSTALLED
+12V
2002
U122
R58 2.2
C9 .1uF
R57 200 1/2W
C11 470uF
R56 2.2 1/2W
C10 10uF
VOLUME
VR01 5KP
R49 24K
C6 680pF
R44 24K
C5 100pF
LM324
U98
R48 100K
C12 33pF
R47 100K
[17] DACOUT
R39 100K
R45 12K
R46 1K
C7 33pF
R40 100K
R41 100K
NOT INSTALLED
[3] /IGID
[3] /OGIA
[3] /OGID
LS132
U97
LS32
U125A
LS74
U124A
U124B
U125C
[1] MCLK
WAIT[1]
CINEMATRONICS
CINEMAT SYSTEM
TITLE
GI SOUND OUTPUT
SIZE B
CODE
NUMBER 81-12170-12
REV A
DATE 9-25-85
SHEET 18 OF 18


THE LELAND CORPORATION
TITLE DUAL SHAFT ENCODER INTERFACE Z80 AND MEMORY
DSEZ80
SIZE B
CODE
NUMBER 81-16100-01
REV B
DATE 6-7-87
SHEET 1 OF 2
J1A
J1B
Z-80B
U11
EPROM
U12
U13
A0-A15
D0-D7
/CS1
/CS2
PA15
RGS-24
U4
RGS-25
U3
HCT74
U2
HCT08
U1
NOT INSTALLED
R1
330
/MREQ
/IORQ
/RD
/WR
/BRD
/RFSH
/POR
/XY
/Y
/X
/HI
/CAL
/EXP
BB0
BB1
+5


THE LELAND CORPORATION
TITLE
DUAL SHAFT ENCODER INTERFACE
SIZE B
CODE
NUMBER 81-16100-01
REV B
DATE 6-8-87
SHEET 2 OF 2
NOTES:
C1;C14 = 10uF
C2-5;C8-13;C15 = 0.1 uF
74LS491
HCT173
HCT74
HCT240
HC240
HC86
U14
U15
U16
J2
J3
J4
J5
C6 .001uF
C7 .001uF
R2 330
R3 330
R4 4.7K
R5 4.7K
A
B
INDEX
/CAL
/LD1
/LD2
/HI
/XY
/X
/Y
D0-D7



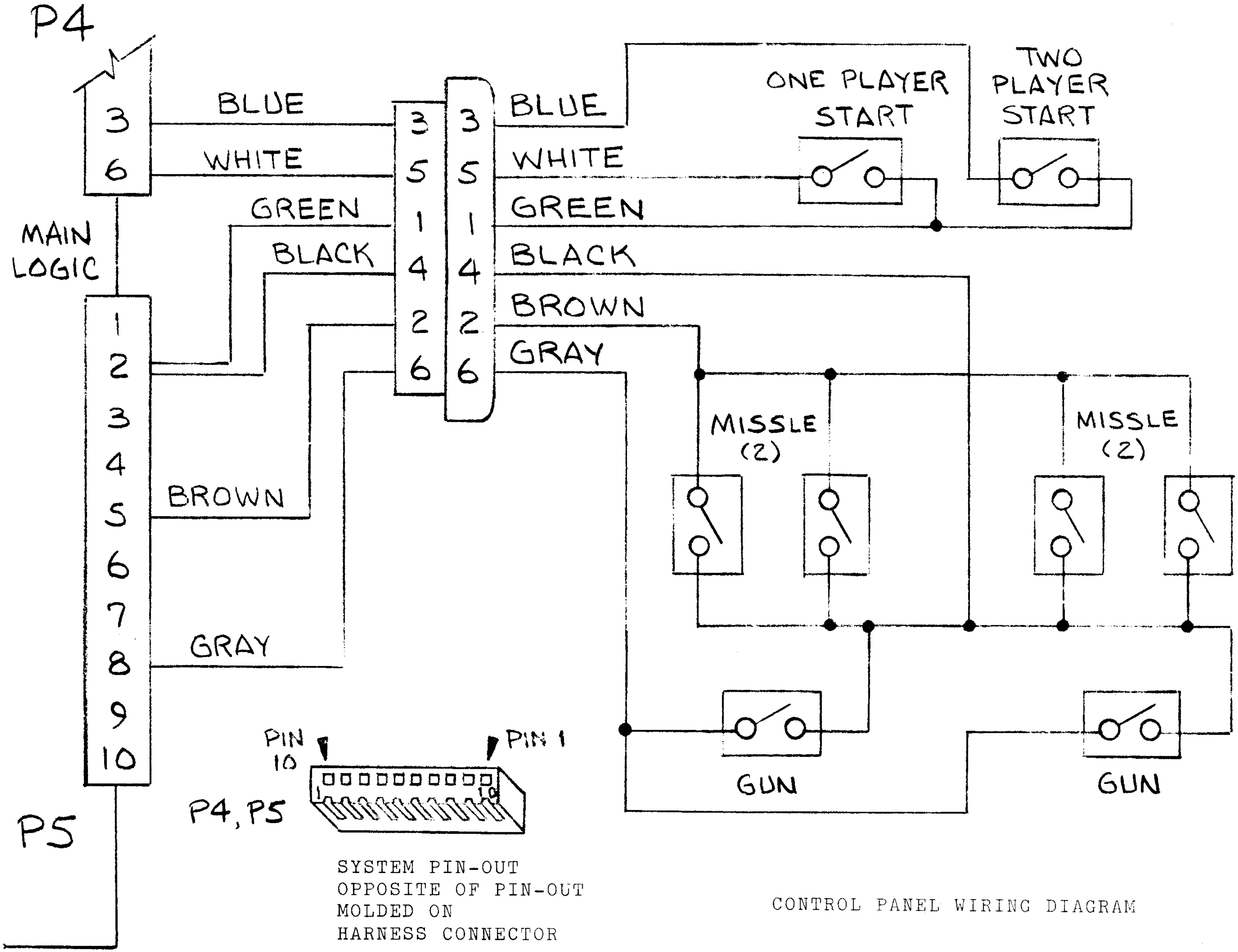
THE LELAND CORPORATION			
TITLE SHAFT ENCODER DRIVER			
SIZE B	CODE	NUMBER 81-16200-01	REV B
DATE 6-8-87			SHEET 1 OF 1



AC/DC POWER CONNECTION

FIG. 1

PAGE 45

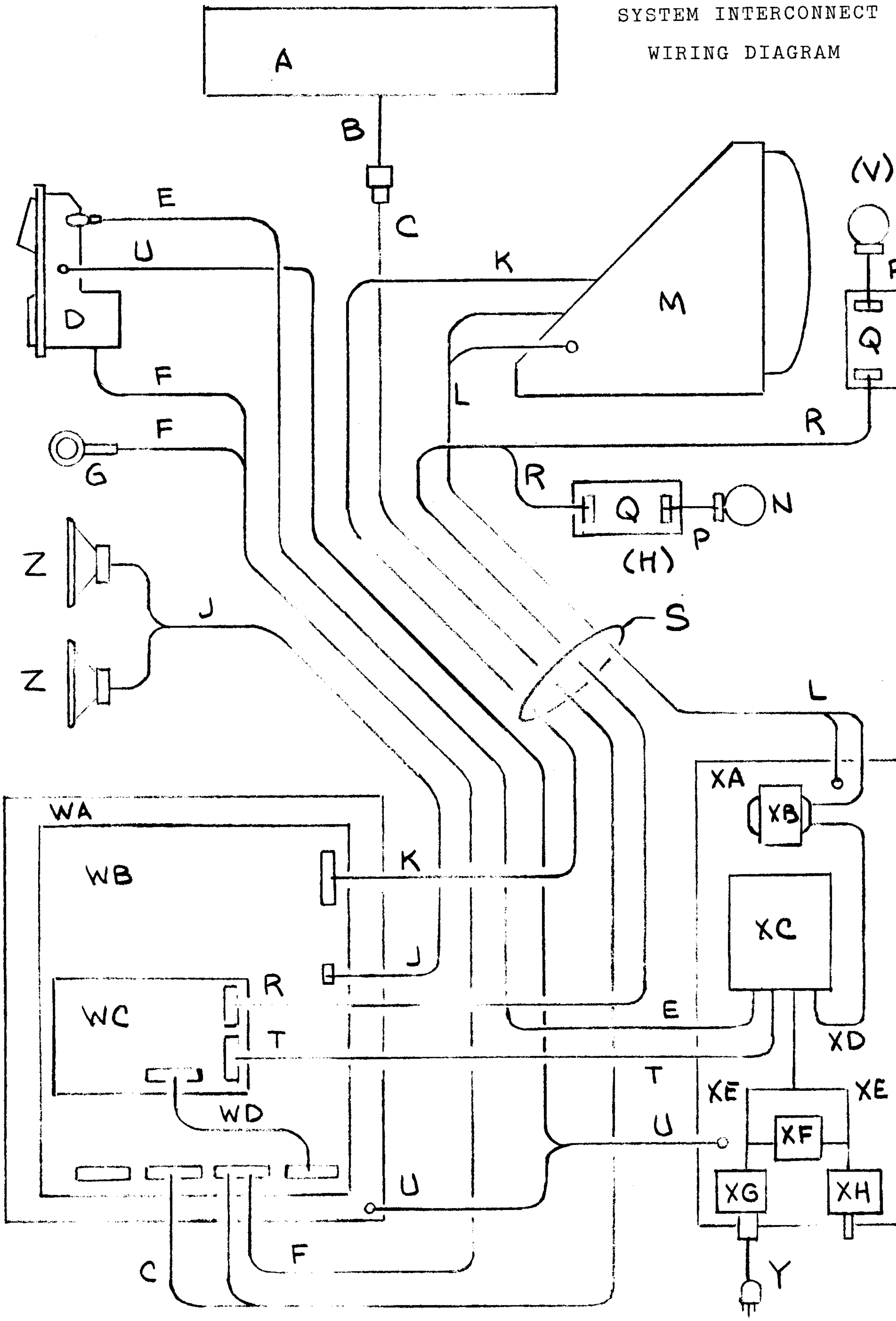


CONTROL PANEL WIRING DIAGRAM

FIG. 2

SYSTEM INTERCONNECT

WIRING DIAGRAM



SYSTEM INTERCONNECT DIAGRAM

A. CONTROL PANEL
ASSEMBLY
38-30025-01

B. CONTROL PANEL
HARNESS
87-18011-01

C. CONTROL PANEL
INTERFACE HARNESS

D. COIN DOOR ASSEMBLY
WITHOUT VAULT
19-30025-01

SHORTENED COIN VAULT
20-30010-01

E. COIN DOOR LIGHT
HARNESS
87-18001-01

F. COIN/SERVICE
HARNESS
87-14052-01

G. SERVICE SWITCH

SHORT RED BUTTON
37-11192-02

LEAF SWITCH WITH
BRACKET FOR
SHORT BUTTON
37-11373-01

SERVICE SWITCH
METAL BRACKET
20-13135-01

(H) HORIZONTAL

J. SPEAKER HARNESS
87-18007-01

K. VIDEO HARNESS

L. MONITOR POWER/
GROUND HARNESS

M. MONITOR
39-10819-01

FOR N,P AND Q:
(H) IS HORIZONTAL
(V) IS VERTICLE

N. SHAFT ENCODER
50-11575-01

P. SHORT SHAFT ENCODER
HARNESS WITH ECGE CARD
CONNECTOR
87-18009-01

Q. SHAFT ENCODER DRIVER
PRINTED CIRCUIT
ASSEMBLY
81-16200-01

R. SHAFT ENCODER
INTERFACE HARNESS

S. MAIN HARNESS
(MADE UP OF C,K,L,R
AND WD)
87-18005-01

T. D.C.POWER HARNESS
87-16031

U. GROUND BRAID
87-16031-01

(V) VERTICLE

Y. A.C.POWER CORD
87-12143-01

Z. 7-INCH SPEAKER
71-10834-01

4-INCH SPEAKER
71-10900-01

6x9-INCH SPEAKER GRILL
20-12398-01

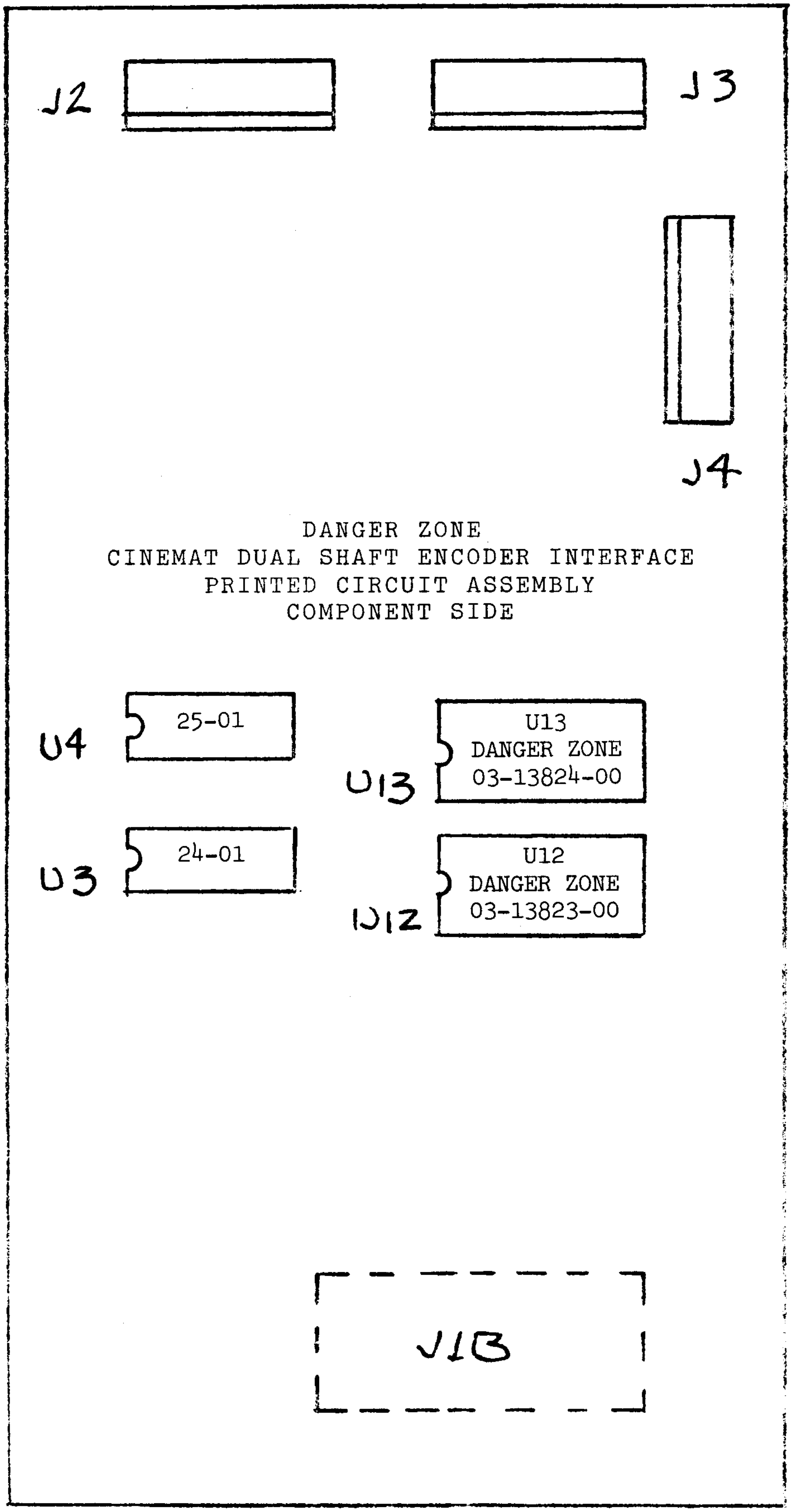

J2
J3
J4
DANGER ZONE
CINEMAT DUAL SHAFT ENCODER INTERFACE
PRINTED CIRCUIT ASSEMBLY
COMPONENT SIDE
U4
25-01
U13
DANGER ZONE
03-13824-00
U13
U3
24-01
U12
DANGER ZONE
03-13823-00
U12
J1B

FIG. 5

MOUNTING D.AGRAM, DUAL SHAFT ENCODER BOARD

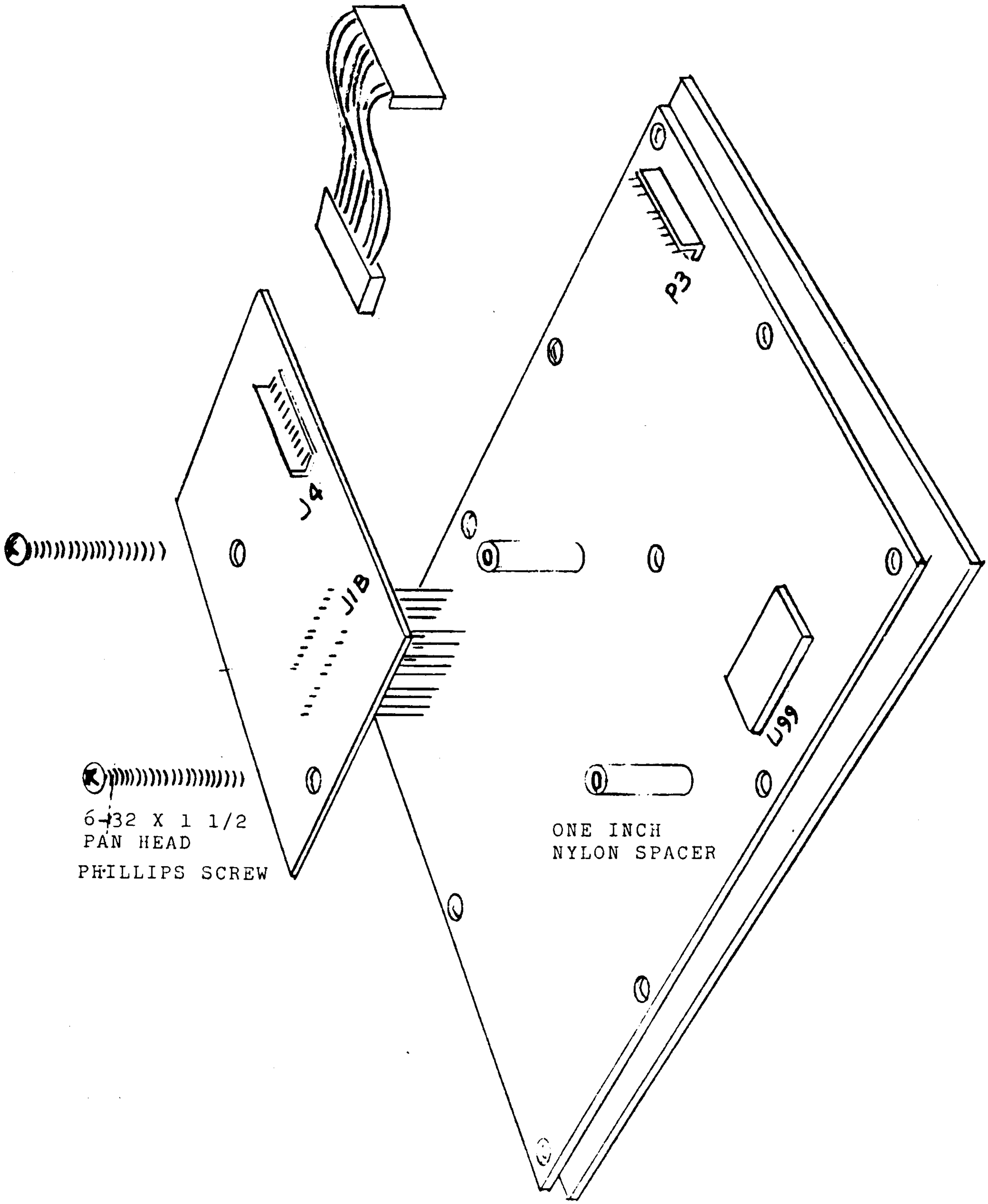


FIG. 6